

# 2002

Environmental Report  
**Murata Group**



*Innovator in Electronics*

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**Company Name** Murata Manufacturing Co., Ltd.  
**Date of Incorporation** December 23, 1950 (established in October 1944)  
**Paid-in Capital** ¥69,376 million (as of May 1, 2002)  
**Sales Amount** ¥394,755 million (as of March 2002)  
**Number of Subsidiaries** Consolidated: 51 (22 in Japan and 29 overseas)  
 Affiliated: 1 (overseas) (as of April 1, 2002)  
**Number of Employees** Consolidated basis: 27,386  
 Parent Co. basis: 5,065 (as of March 31, 2002)  
**Stock Exchange Listings** Domestic: Tokyo, Osaka Overseas: Singapore  
**Head Office** 26-10, Tenjin 2-chome, Nagaokakyo-shi, Kyoto 617-8555, Japan  
**URL** <http://www.murata.com/>  
 For more information, contact the Public Relations Section, General Administration Department  
**Phone:** 81-75-955-6786  
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**E-mail** [env@murata.co.jp](mailto:env@murata.co.jp)

## About this Environmental Report

This environmental report presents the environmental management vision, targets, details of implementation and results of the Murata Group in Japan and internationally.

In preparing this report, we made reference to the Sustainable Reporting Guidelines of GRI (Global Reporting Initiative); Environmental Report Guidelines, 2000 Edition, by the Japanese Ministry of the Environment; the Environmental Reporting Guidelines 2001, by the Japanese Ministry of Economy, Trade and Industry; and other publications. Furthermore, while we considered including very recent findings among the various statistics presented in this report, this was not feasible due to the circumstances of editing and publication.

## Murata's Approach to Environmental Concerns

Although the environment is the foundation supporting the very survival of humanity and all other living organisms, the many activities of the human race have brought about global environmental problems that are among the most far-reaching challenges we face today.

The Murata Manufacturing Group ("Murata"), while making use of the Earth's finite resources amid the blessings of the natural environment, has consistently undertaken careful research and development of materials and has constructed production facilities in order to produce a variety of electronic components. In providing these important products to the world, we have given much attention to the need to use the Earth's resources efficiently. We believe that we must place special priority on business activities that allow for harmonious coexistence with the environment by not placing an undue burden on the environment.

Since its establishment, Murata has compiled the insights of its management into the Murata Philosophy that serves as the basis of the attitude and conduct of all employees of the company. Furthermore, on the occasion of the company's 50th anniversary in 1994, we developed Murata's "Mind Identity," expressing our ideals through the slogan Innovator in Electronics. This initiative expressed our wish to contribute to the realization of a richer life for people around the world through the development of the "age of electronics." As part of this effort, and while shaping the entire Murata Group into an innovator in the age of electronics, we pledge to remain continuously aware of the need to make products that do not waste energy resources and conduct production methods that do not harm the environment in all our research, development, production and other activities. Moreover, we pledge to fully consider the environment and to work strenuously to ensure harmonious coexistence with the global environment.

To date, our basic approach has been to advance the following significant environmental initiatives:

- product miniaturization and reuse of product packaging;
- reduction of carbon dioxide emissions by introducing co-generation facilities;
- elimination of ozone-depleting chemicals and chlorinated organic solvents;
- elimination of incinerators and promotion of paper recycling;
- introduction of composting facilities for raw food waste from company dining facilities;
- increased use of recycled products by promoting green procurement; and
- acquisition of certification of registration with ISO 14001, the international standard for environmental management systems.

No business can develop or prosper without consideration for the health of the environment and society. Therefore, we will continue our efforts to develop and fulfill these initiatives.

### MURATA PHILOSOPHY WE PLEDGE...

#### *To Contribute...*

To The Continued Worldwide Development Of  
Industry And Culture Through  
Management Commitment

#### *To Pursue...*

Total Quality And Customer Satisfaction, While  
Continuously Introducing Innovative Products In  
Integrated And Interrelated Technologies Which  
Will Allow Our Company, Our Employees,  
Customers And Other Partners, And Our Communities

#### *To Grow And Prosper...*

With An Appreciative Feeling Of Mutual  
Pride And Trust



President  
Murata Manufacturing Co., Ltd.  
**Yasutaka Murata**

## Business Activities

Since its establishment in 1944, Murata has conducted wide-ranging research and development of functional ceramics as functional raw materials. Focusing primarily on the electrical properties of ceramics, Murata has built on the success of our representative dielectric product, the chip monolithic ceramic capacitor, to develop piezoelectric products such as ceramic filters as well as microwave devices and modules incorporating thin film forming technology, micro-scale processing technology, and microwave circuit design technology. In addition to developing these varied electronic components, we have developed related products while refining our manufacturing and marketing expertise.

Working in the belief that "new quality electronic equipment begins with new quality components, and new quality components begin with

new quality materials," Murata has maintained consistent production of items ranging from inorganic and organic chemical materials to ceramics and electronic components. Supporting this effort as the foundation of the company's material, process, design and production expertise, Murata's R&D initiatives emphasize the vertical integration of these technologies.

In recent years, the global electronics industry has been making rapid progress toward ever more compact and thin form factors while developing electronic devices and tools offering enhanced functionality and multifunctionality. Moreover, the market for products incorporating microwave and digital technologies has grown significantly, particularly in the area of mobile communications equipment and computer-related equipment. The result of these trends has been a growing demand for new components.



Dielectric Products



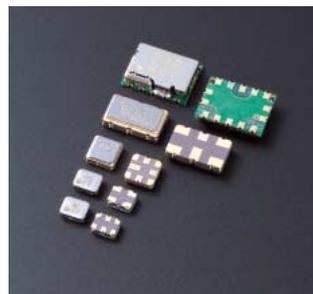
Chip Monolithic Ceramic Capacitors



Thermistors



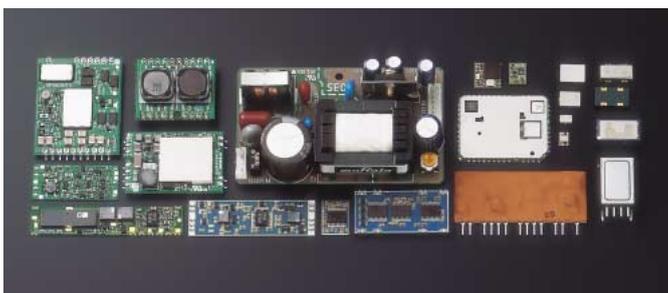
Piezoelectric Products



Surface Acoustic Wave (SAW) Filters



"EMFIL"™, EMI Suppression Filters



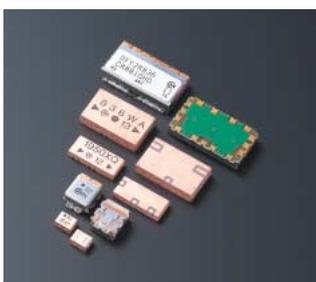
Functional Modules



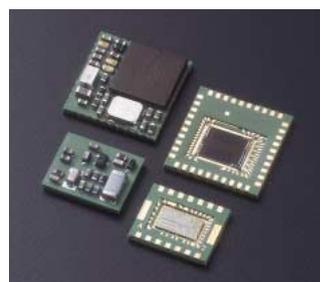
VCOs (Voltage Controlled Oscillators)



Piezoelectric Application Sensors



"GIGAFIL"™, Dielectric Filters



"Bluetooth"™, Application Modules



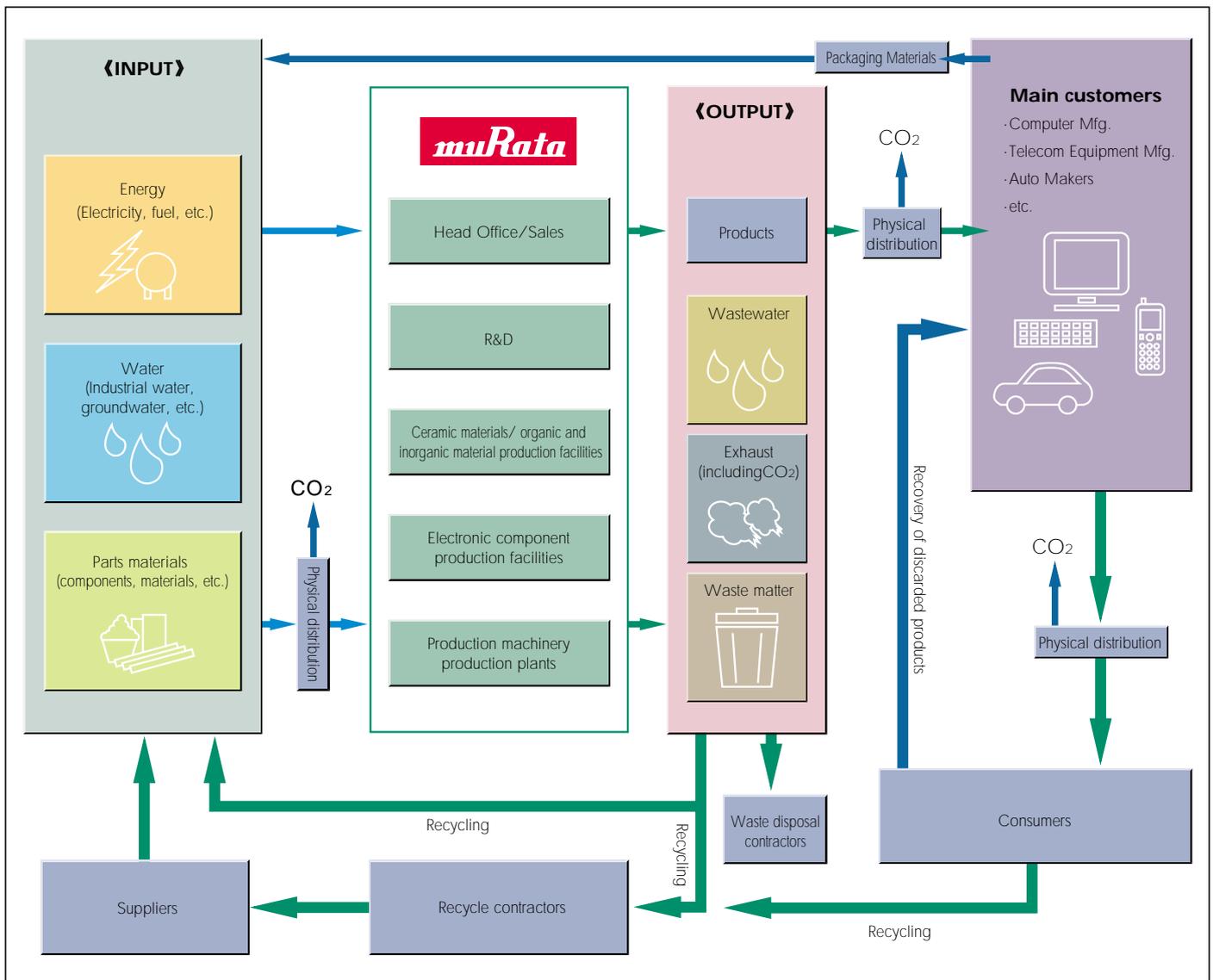
Chip Dielectric/Multilayer Antennas



Chip Coils

Microwave Devices

## Relation between Our Business Operations and the Environment



Compost made from raw food waste from company dining facilities, etc., used as fertilizer (Fukui Murata Manufacturing Co., Ltd.)



Composting of chips from pruning of trees and shrubs (Murata's Yasu Plant)

## Policy, System, Objectives and Targets

In 1995, Murata established its Environmental Charter, which spells out the basic environmental policy and action plan for the whole group. Murata is making a daily effort to put this commitment into practice.

### Murata Environmental Charter

#### Corporate Environmental Policy

##### 【Concept】

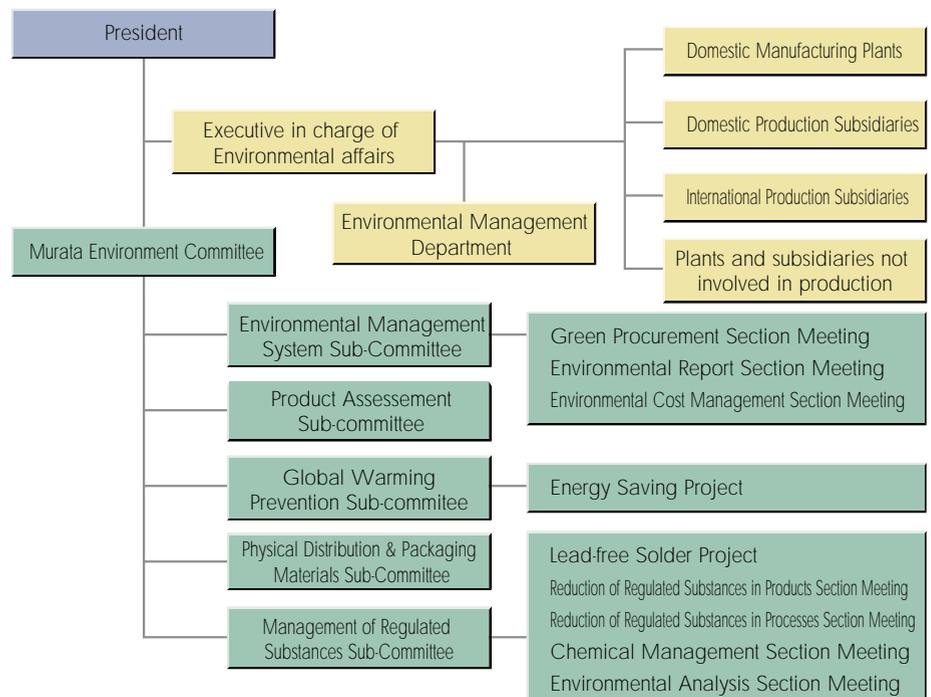
In the desire to contribute to a truly rich human society, we develop materials and products, devise and maintain production activities, and supply products worldwide. However, we cannot deny that our production activities as well as our products themselves are unintentionally affecting the global environment. We fully acknowledge this impact on the global environment and are taking action to reduce our environmental impacts as one of the important initiatives being put into practice as part of our Murata Philosophy and establishment vision. We will unite the efforts of our management organization, repeatedly work toward reducing our environmental impacts, and through management efficiency determine the points at which business and environmental interests converge.

##### 【Action Guidelines】

1. Not restricting ourselves merely to the observance of environmental laws and regulations, we will establish a voluntary management standard and will strive to improve our management standards for environmental protection.
2. We will strive to reduce the environmental impacts of our products.
  - 2-1 In our R&D and design activities, we will consider approaches that will minimize the environmental impact of our products.
  - 2-2 In cases where a product contains an environmentally hazardous substances, we will seek ways to reduce the amount used or incorporate a more benign substitute.
  - 2-3 In the effort to minimize the amount of packaging materials used with our products, we will adopt a "reduce, reuse and recycle" policy.
  - 2-4 We will develop procurement activities through which we will select materials that have minimal direct or indirect environmental impacts.
3. We will strive to reduce the environmental impacts of our business operations.
  - 3-1 To help prevent global warming, we will implement energy conservation and reduce greenhouse gas emissions.
  - 3-2 Where production processes make use of environmentally hazardous substances, we will seek ways to reduce the amount used or incorporate a more benign substitute.
  - 3-3 We will aggressively seek to reduce, reuse and recycle wastes and will seek to minimize the amount of waste produced and conserve resources.
4. Through aggressive social initiatives, we will adopt environmental preservation activities in close contact with the local community and promote afforestation of corporate land according to a systematic long-term plan while working to improve the local environment.
5. While making all employees aware of the environmental policy, we will strive to raise employee awareness of higher environmental ethics. Moreover, we will develop timely and appropriate educational as well as public relations activities.
6. We will strive to become a corporation focused on environmental management and active public disclosure of our achievements in this area.
7. In order to implement each of the above action guidelines, we will establish and adopt our environmental action plan while continuously striving to improve our environmental performance.

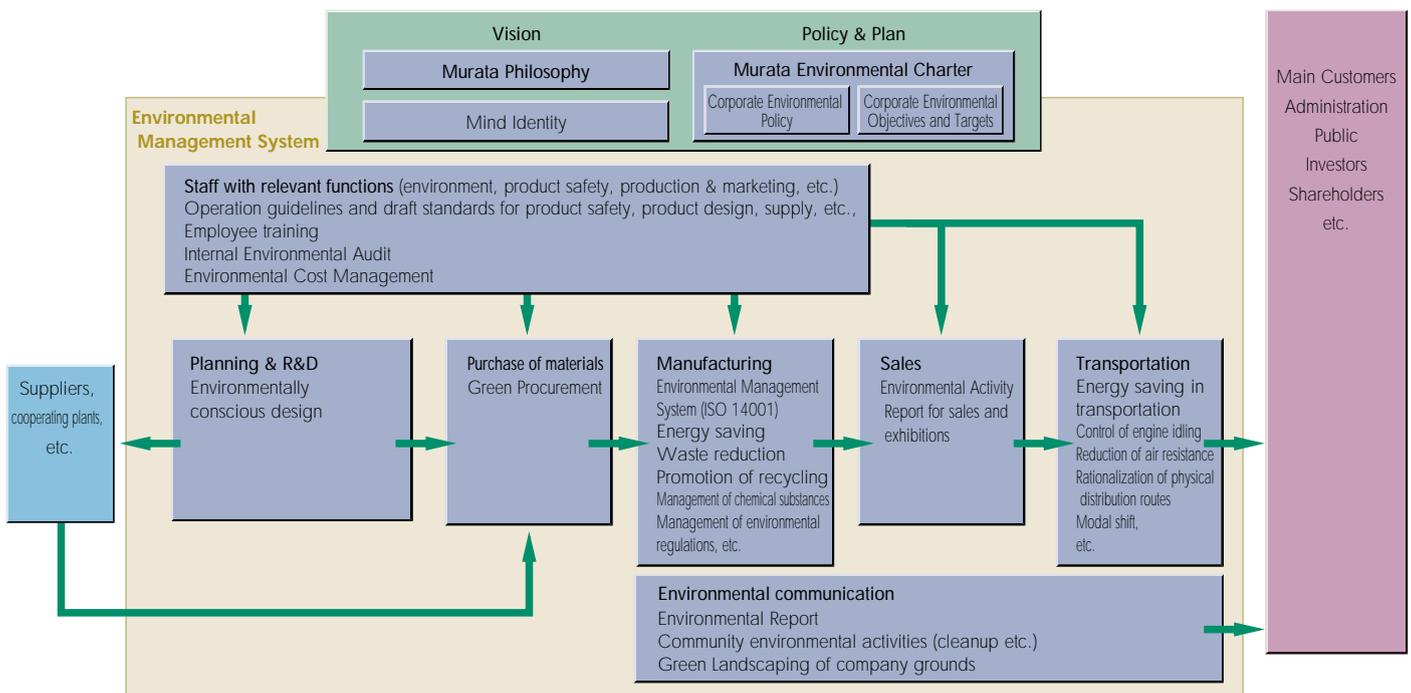
### Promotion System

Murata, as the party responsible for harmonizing the environmental conservation activities of the entire group, we will appoint an individual responsible for environmental affairs (currently, the vice president). As well, with the Environmental Management Department as the functional staff, we are promoting comprehensive environmental preservation activities. Moreover, we will include the entire group and will examine and deliberate various themes. We have also established a Murata Environment Committee as a consultative body to the president. For the lower branch of the Environment Committee, we have established sub-committees and section meetings according to theme, and are conducting specialized research and planning activities.



## Corporate Objectives and Targets

Theme	No.	Item	Objectives and Targets
Environmental Management	1	Continual Improvement	While maintaining an environmental management system compliant with the ISO 14001 international standard for our production facilities, we will strengthen our cooperation with the entire company's environmental management system. At the same time, we will measure the ongoing reduction in our environmental impacts. As well, we will undertake environmental remediation of soil and groundwater contamination that occurred in the past.
	2	Environmental Cost Management	While developing a grasp of the costs of global environmental preservation activities and management plans in more detailed classifications by objective, we will introduce this plan across the entire company by the end of fiscal 2003. We will use that information to plan for improved environmental efficiency.
Providing Environmentally Conscious Products	3	Environmental Conscious Designs	We will promote environmental conscious design targeting product designs that are considerate of the environment. By the end of the fiscal 2003, we will have implemented environmental conscious design company-wide. Moreover, we will undertake product assessments and ensure their development throughout the company.
	4	Management and reduction of environmentally hazardous substances that are contained in products	Regarding environmentally hazardous substances, we will actively promote the adoption of alternative substances as well as the conversion to alternative technologies within the scope of feasibility. Specifically, we will supply products containing substitutes for the lead contained in the metal plating applied to electrodes and lead wires as well as for the solder used for internal parts to the greatest extent possible.
	5	Improvement of packaging materials	We will promote bulk case packaging for chip components.
	6	Green procurement	We will actively incorporate materials with low environmental impacts by promoting a green procurement policy. By the end of fiscal 2001 we implemented green procurement in all our domestic offices, and by the end of fiscal 2003 we will have extended this policy to all our offices outside Japan.
Environmentally Sound Business Activities	7	Preventing global warming	We will promote the effort to prevent global warming. By the end of fiscal 2003 we will have reduced carbon dioxide emissions per unit of net sales by 10% compared with the fiscal 1990 levels. We pledge to further reduce carbon dioxide emissions per unit of net sales by 30% compared with the fiscal 1990 levels by the end of fiscal 2010.
	8	Implementing a policy of resource conservation and reducing, reusing and recycling wastes	We will adopt the challenge of zero emissions by promoting the "3R policy" of Reduce-Reuse-Recycle. By the end of the fiscal 2003, we will achieve zero disposal of landfilled waste, and we will reduce total emissions per unit of net sales by 10% compared with the fiscal 2000 levels.
Environmental Communication	9	Management and reduction of environmentally hazardous substances used in processing	As for the environmentally hazardous substances, we will actively promote the adoption of substitute substances having a reduced environmental impacts as well as conversion to alternative technologies. Additionally, we will reduce the atmospheric output of volatile organic solvents.
	10	Green Landscaping	As part of the systematic promotion of green landscaping at each of our offices, we will implement green landscaping objectives at each office and will establish a medium-term green landscaping plan.
	11	Coexistence with local communities	Each office will develop environmental activities rooted in the community and will plan for harmonious coexistence with the local environment.
	12	Information disclosure	We will compile and publicly disclose a company-wide Environmental Report by the end of 2002.



## Outline of Initiatives to Date

Below we introduce an outline of Murata's global environmental preservation initiatives and social activities to date.

### 【Policy & System】

To promote the preservation of the global environment company-wide, we have developed the following policy, plan and system.

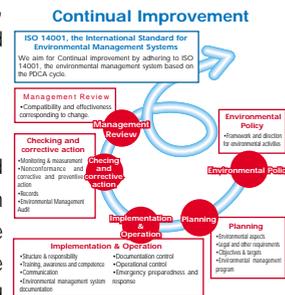
- October 1994 The Murata Environmental Committee is established as an advisory organ for top management to devise strategies for global environmental preservation.
- January 1995 A special sub-committee is established as the lower branch of the Environmental Committee to carry out planning and drafting of documents classified by individual theme.
- May 1995 The Murata Environmental Charter is adopted.
- May 1995 The Environmental Management Department is established in the head office as a body dedicated to promoting global environmental preservation.
- May 2001 The Murata Environmental Charter is revised.

See pages 5-6.

### 【Environmental Management System】

We have developed and maintained an environmental management system as part of the plan to promote the Murata Environmental Charter.

- The international standard for environmental management systems (ISO 14001)  
A total of 25 of the Company's production sites, both domestic and international, have acquired registration of ISO 14001 certification.



- Internal environmental audit  
The Company has undertaken a four-pronged audit of internal operations, including an internal audit by plants, an audit by the Environmental Management Department of the head office, an inspection by the auditor, and an audit by the ISO 14001 certification body.

See pages 9-12.

### 【Dealing with Environmental Risk】

Since 1995, we have been taking initiatives to avoid the possibility of any chemical substances permeating soil and groundwater, including moving storage tanks from below ground to above ground; moving underground plumbing overhead; and adopting voluntary standards for coatings to prevent permeation. We are taking steps to adapt to this voluntary standard, and as of the fiscal 2001 we have achieved this initiative in all but a certain sector.



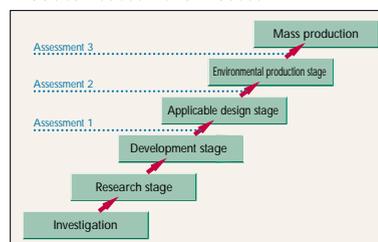
See page 12.

### 【Environmentally Conscious Design】

We have focused attention on the environmental impact of each product and have been promoting initiatives to reduce that impact.

The Life Cycle Assessment (LCA) Sub-Committee (currently the Product Assessment Sub-Committee), a specialized Sub-Committee of the Environmental Committee, carries out LCA data analyses of Murata's representative products and compiles the company's unique LCA guidelines.

#### Product Assessment Process



In addition, while carrying forward this activity step-by-step, we are developing a product assessment plan that addresses environmental considerations during the product design stage.

See page 13.

### 【Environmentally Hazardous Substances and Lead-Free Solder】

We have been promoting an initiative to reduce consumption or adopt substitutes for toxic substances (environmentally hazardous substances) included in our products.

Murata has adopted a voluntary regulation chart especially for environmentally hazardous substances that are related to our products. Since April 1996, we have been implementing systematic reductions and substitutions.

In addition to this initiative, we have established the Lead-Free Solder Project as a strategy for promoting the use of solder containing no lead. As a result, we have been promoting a lead-free solder policy.

See pages 14-15.

### 【Packaging & Distribution】

To reduce the amount of packaging material that is supplied with products provided to our main customers, we have promoted an initiative targeting resource conservation through a policy of reuse and recycling.

Previously, we collected and reused taping packaging reels and incorporated simple packaging, especially reused packaging material. To contribute to energy conservation during distribution, we



Bulk case

have been focusing on bulk case packaging, which has brought about considerable benefits.

See pages 17-18.

## 【Green Procurement】

If a Murata product is to be environmentally benign, the materials supplied for making that product, as well as the process by which the product is manufactured, must be environmentally benign as well.

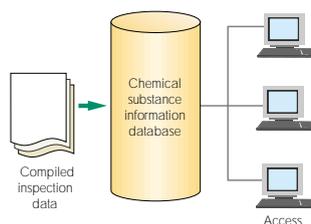
In 2001, Murata distributed its Green Procurement Guide for procurement suppliers within Japan. In conducting our material procurement activities, we have sought the understanding and cooperation of our suppliers in Japan as part of our approach to reducing environmental impacts.



See page 19.

## 【Management of Chemical Substances】

To ensure that chemical substances are used properly across the entire group of companies in Japan, we have introduced a chemical substance inspection and registration system in 2000. Before a chemical substance is introduced in a production process, specialist staff examine the substance beforehand. If judged acceptable, it is assigned a unique number and information on the substance is registered in a database; only then can it be purchased and used. To ensure that such chemical substances are used properly, we are planning on sharing all relevant information.



Also, in 1997, we created a voluntary regulation chart for chemical substances that impart an environmental impact that are used in the production process. In this way we are promoting the reduced use and substitution of such products.

See page 20.

## 【Preventing Global Warming】

Although we have long addressed the issue of energy saving, we have been focusing on more specific activities in this area since the fiscal 1995. In particular, we have been promoting aggressive energy saving activities from two main perspectives - utility facilities and production facilities.

Having established fiscal 1990 levels as the standard, we have been promoting the objective of reducing carbon dioxide emissions by 30% per unit of net sales by the end of fiscal 2010. However, for the fiscal 2001, emissions by Murata's operations in Japan increased by 32% compared with the fiscal 1990 levels. The main reasons for

this increase are thought to be a drastic reduction in the unit price of products as well as a drop in production which led to shortfall in energy saving targets and carbon dioxide emission targets.



See pages 21-22.

## 【Resource Conservation and Waste Reduction】

We have reviewed our production processes, controlled the production of waste, and promoted initiatives to reuse the resources in any waste that is produced.

### Main Initiatives

- Elimination of incinerators and recycling of used paper
- Introduction of composting facilities for raw food waste from company dining facilities
- Introduction of waste liquid condensers
- Recycling of films with ceramics
- Distillation regeneration and reuse of waste organic solvent
- Turning waste plastic into refuse derived fuel, etc.

As a result of these initiatives, the total internal recycling rate was 53.3% for the fiscal 2001 (compared with 38.3% for the fiscal 2000).

See pages 23-24.

## 【Soil & Groundwater Strategies】

After the fiscal 1983, the year the carcinogenic characteristics of chlorinated organic solvents such as trichloroethylene became a problem, we have recognized that such substances are an important issue. We set out to eliminate the use of such solvents, and by the fiscal 1995 we succeeded in eliminating their use in all but one location. One factory reluctantly continued use of the product because of the product preferences of a particular customer; anyway, we eliminated the use of this substance at this factory in March 1998.

Moreover, because we had used chlorinated organic solvents in the past, we have been conducting surveys of the soil and groundwater. At plants that were deemed to be in need of remediation (decontamination), we established purification facilities in the contaminated regions and drilled wells on the borders of such sites. We actively promoted remediation (decontamination) of the contaminated soil and groundwater and we will continue to prevent diffusion outside the company property.

See pages 27-28.

## 【Occupational Health and Safety, Contributing to the Community, and Green Landscaping of Company Grounds】

Regarding worker health and safety, although we previously addressed this issue, in 2000 we introduced a system for advance investigation and registration of chemical substances that may affect worker health and safety before a chemical substance is introduced at the production stage. Moreover, in 2001 we introduced a risk assessment system for development of production facilities. In addition, we established a periodic health and safety forum in order to improve the level of health and safety throughout Murata while promoting activities targeting employee health.

We are also promoting active green landscaping of company grounds in order to gain the interest of regional society while enriching the work environment. Also, aware of our role as a member of the local community, we will cooperate with local citizens and local governments. Additionally, we are promoting community initiatives such as the community clean-up activities and opening company green tracts to the public.

See pages 29-31.

## Environmental Management System

Murata, a global enterprise that has developed its business internationally, has adopted an environmental management system as an important aspect of its environmental stewardship. By adhering to the "Plan-Do-Check-Action" (PDCA) cycle, we are continually reducing our environmental impacts.

### ISO14001

All of Murata's production sites in Japan and in other countries have acquired certification of registration with ISO 14001, the international standard for environmental management systems.

The ISO 14001 standard for environmental management system calls for the formulation and implementation of the following management plan.

Environmental policy targeting environmental preservation are identified; a concrete plan is established and enforced; checks and corrective measures are conducted; and all aspects are reviewed by top management. In some cases, depending on the results of these reviews, the environmental policy may be modified. The ongoing implementation of this plan results in continual improvement of the plan itself. As a result, the achievements of the plan are also improved.

### ISO 14001-registered production sites in Japan and other countries (In order of registration)

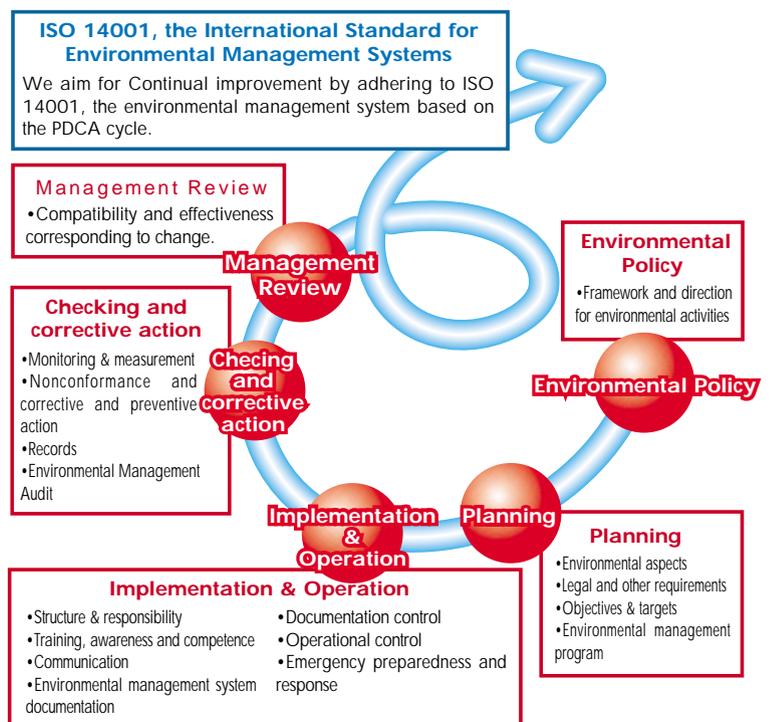
Production Site	Certification Body	Date of Registration
Taiwan Murata Electronics Co., Ltd.	BSMI	September 30, 1997
Murata Electronics Singapore (Pte.) Ltd.	PSB	December 5, 1997
Kanazawa Murata Manufacturing Co., Ltd.	JACO	December 22, 1997
Murata Electronics(Thailand) Ltd.	UL	October 5, 1998
Murata Manufacturing Co., Ltd., Yokaichi Plant	JACO	November 25, 1998
Fukui Murata Manufacturing Co., Ltd.	JACO	December 25, 1998
Izumo Murata Manufacturing Co., Ltd.	JACO	December 25, 1998
Toyama Murata Manufacturing Co., Ltd.	JACO	December 25, 1998
Komatsu Murata Manufacturing Co., Ltd.	JACO	February 23, 1999
Murata Manufacturing(UK) Limited	BSI	March 9, 1999
Murata Electronics(Malaysia) Sdn. Bhd.	SIRIM	August 6, 1999
Beijing Murata Electronics Co., Ltd.	CCEMS	September 23, 1999
Okayama Murata Manufacturing Co., Ltd.	JACO	October 27, 1999
Murata Electronics North America, Inc.	LRQA	November 11, 1999
Tome Murata Electronics Co., Ltd.	BVQI	November 20, 1999
Kanazu Murata Manufacturing Co., Ltd.	BVQI	November 27, 1999
Azumi Murata Manufacturing Co., Ltd.	JACO	December 1, 1999
Himi Murata Manufacturing Co., Ltd.	JACO	December 1, 1999
Hakui Murata Manufacturing Co., Ltd.	JACO	December 2, 1999
Iwami Murata Electronics Co., Ltd.	JACO	December 2, 1999
Sabae Murata Manufacturing Co., Ltd.	BVQI	December 5, 1999
Murata Manufacturing Co., Ltd., Yasu Plant	JACO	December 27, 1999
Wakura Murata Manufacturing Co., Ltd.	JACO	December 27, 1999
Anamizu Electronics Industries, Ltd.	JACO	December 27, 1999
Wuxi Murata Electronics Co., Ltd.	CCEMS	January 21, 2000

#### 【Kanazawa Murata Manufacturing】

In Ishikawa prefecture, we introduced an ISO 14001-compliant environmental management system as well as other initiatives. Moreover, we implemented activities targeting preservation of the global environment. As a result of our efforts, we were awarded the "Ishikawa Prefectural Governor's Green Enterprise Award," which was established in 2001 to award enterprises for outstanding achievements and for serving as a model for other enterprises. We were honored that Kanazawa Murata Manufacturing Co., Ltd. became the first enterprise to win this award. The company was highly evaluated for its continued efforts targeting global environmental preservation based upon its ISO 14001-compliant environmental management system and efforts to contribute to the community in environmental activities such as cleanup of the factory grounds and its surroundings, and green landscaping of corporate land holdings.



## Continual Improvement



## Environmental Cost Management

Murata has long instituted and managed a budget for environmental preservation, pollution control, energy saving and prevention of soil and groundwater contamination. Moreover, we have allocated a reserve amount to cover the total cost of remediation efforts to correct soil and groundwater contamination, and we have enforced the management of costs related to the environment.

With the revision of the Murata Environmental Charter in May 2001, we further developed and refined our existing environmental cost management, clarified the cost of Murata's investment in environmental preservation, and highlighted its results in more detailed classifications according to objective. By using this information effectively, we are aiming to ensure efficient environmental management.

Currently, we are making progress with in-house surveys on several issues: how to apply the information in management decisions on the cost and effectiveness of environmental investments; how to determine environmental costs and effectiveness in business activities; and how to tabulate these environmental costs.

As part of the Murata Environmental Objectives and Targets, we have scheduled the design of a data compilation system for the entire group by the end of fiscal 2003.

The amount invested in environmental preservation and in remediation of soil and groundwater contamination is outlined in the chart below. Regarding the accounting of remediation costs for contaminated soil and groundwater in particular in terms of business accounting, we have made a trial calculation of all costs accruing through to completion of the contamination remediation strategy and have appropriated a security reserve amount as a liability.

### Investment in Environmental Preservation (Millions of yen)

Classification of Investment Objective	Total Expenditures for Fiscal 1998-2001		Expenditure for Fiscal 2001	
	Nonconsolidated	Consolidated	Nonconsolidated	Consolidated
Pollution control	55	151	15	333
Global environmental preservation	587	653	3	17
Recycling of resources	451	724	0	62
Prevention of soil and groundwater contamination	226	431	0	122
Others	10	71	9	23
Total	1,329	2,030	27	557

See page 12.

### Remediation Cost of Soil and Groundwater Contamination (Millions of yen)

Total up to end of Fiscal 2001		Estimate for Fiscal 2002 and thereafter	
Nonconsolidated	Consolidated	Nonconsolidated	Consolidated
754	6,109	208	4,810

Total costs of pollution remediation (decontamination) until completion are calculated on a trial basis and appropriated as a liability.

See page 27.

## Environmental Training

Each Murata employee supports the promotion of business activities that consider the environment, as the contribution of everyone is required in this effort. We believe that all employees should understand and practice the environmental vision and objectives set forth by corporate management and the initiatives of the plants and divisions, as these represent the driving force for environmental preservation.

Therefore, we are implementing practical environmental training and raising awareness according to this objective.

### Environmental Training

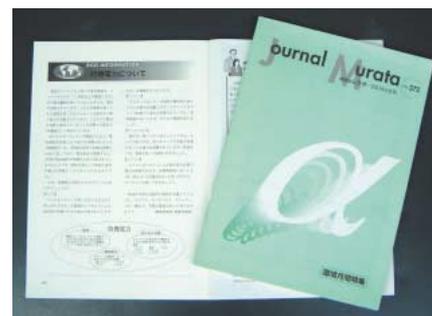
In addition to a general environmental training intended to impart an understanding of Murata's environmental vision and objectives, we also provide programs such as in-house courses that provide training for internal environmental auditors.

Training Item	Content
New recruit training	Lecture on environmental preservation held during initiation assembly for new recruits
Practical training in environmental management system at plants	Periodical practical environmental training in the environmental management system at production sites and production subsidiaries
In-company courses for training internal environmental auditors	To develop qualified personnel as internal environmental auditors in our plants, we periodically provide courses in-house. As of March 2002, we had trained 370 individuals with qualified official examiners as lecturers.

### Awareness-raising and Promotion

In Journal Murata, our company newsletter, we present an annual feature for Environment Month. At the same time, we introduce the theme for a company-wide initiative, provide information on our state of progress and strategies, and provide examples of successes. In addition, we regularly provide a column for introducing and explaining key words related to environmental preservation in simple terms. In addition, we make plans to raise the awareness of our employees concerning environmental preservation.

Also, we have expanded our company award system with our Global Environmental Protection Promotion Award, an achievement award that recognizes employees who have made a significant contribution to environmental preservation. To date, four environmental initiatives have been recognized with this award.



## Environmental Management System

### Environmental Audits

At each of its production plants and production subsidiaries, Murata undertakes four audits periodically and checks on activities.

1. Internal self-audit of the company's environmental management system
2. Functional staff audit by the Environmental Management Department of Murata Manufacturing Co., Ltd.
3. Audit by auditors
4. Periodic ISO 14001 inspection by a certification body

We undertake audits Nos. 2 and 3 above, except at production plants and production subsidiaries. This audit system, together with the discovery and correction of noncompliance in all kinds of applications, makes use of the data obtained through the audits as basic information for use whenever a review of the entire environmental management system is conducted.

### Plant Internal Self-audit

At each production plant and production subsidiary, we have established a management standard for day-to-day business and are continuing with the discovery and correction of noncompliance and monitoring of operations. In addition, we undertake internal audits at fixed intervals every year, and we undertake activities to correct any issues detected as a result. In this audit, we take steps to determine whether the various prescribed rules are being followed correctly.

This plant internal self-audit has been undertaken at each production plant and production subsidiary since the formation of the plant environmental management system from 1997 to 1999. We intend to upgrade the skills of the auditors by re-training and by building on the experience gained during internal environmental audits.

### Functional Staff Audit by the Environmental Management Department of Murata Manufacturing Co., Ltd.

The internal company audit and the audit by an external certification body are implemented around the appropriate management plan and conformance to laws, as well as improvement targets measured against actual results. As well, Murata's Environmental Management Department, as the main functional staff of the Murata Group, periodically audits all plants and subsidiaries. Using the results of the internal audit and external inspection of the plant, we implement the audit by functional staff by focusing on the state of progress according to the company-wide guidelines and company-wide targets as well as the results of the inspection for conformance to important laws and regulations. This approach aims to compensate for the limited time available for the inspection by the external certification body. In addition, it compensates for the specialized portion that cannot be covered by the plant internal inspection. The audits regarding non-production offices are focused on compliance with the law.



## Dealing with Environmental Risk

To minimize the potential environmental risk of Murata's business activities, particularly in the event of an accident, we are preparing facilities intended to eliminate any impact on the surrounding environment. Considering the potential scale and period of time of the impact, we have established and implemented the voluntary standards

and countermeasures outlined below for facilities related to the storage and transport of chemical substances within the plant.

These countermeasures were completed within the fiscal 2001 in all sections except one.

See page 28.

### Prohibition against underground storage tanks

In principle, storage tanks for fuel, organic solvents, acids, alkalis and waste liquids shall be located above ground. If it is unavoidable that a tank be placed underground due to legal requirements, it shall be a double-walled tank.

### Prohibition against underground piping

Pipes for transporting fluids such as fuel, organic solvents, acids and alkalis as well as waste liquids shall be located overhead.

### Permeation barrier coating

Locations where fluids such as fuel, organic solvents, acids, and alkalis as well as waste liquids are handled shall be provided with a bed made of a permeation barrier coating or stainless steel.

### Emergency containment structure

Workplaces where liquids are received or where waste liquids are discharged to or from tank trucks or the like shall have a structure for immediately containing any leakage should an accident occur.

Example of overhead piping



Example of permeation barrier coating



Example of emergency containment structure



Emergency response drill (Okayama Murata Manufacturing)

In addition to providing the necessary facilities, we stage emergency response drills periodically.



### Cost of countermeasures to prevent ground permeation

(Millions of yen)

FY1995-FY2000		FY2001		Total	
Nonconsolidated	Consolidated	Nonconsolidated	Consolidated	Nonconsolidated	Consolidated
329	1,513	0	122	329	1,635

## Addressing Environmental Preservation through Our Products

Murata has been actively implementing measures such as reducing the use of environmentally hazardous substances contained in its products, designing more compact products, saving power, improving packaging materials, and introducing green procurement measures in order to reduce the environmental impact of its products.

### Developing Environmentally Conscious Products

At Murata, we have been taking steps to reduce the environmental impact of our products. Moreover, we have adopted the life cycle assessment (LCA) method to clarify the issues that should be addressed at every stage of product design in order to reduce the overall environmental impact.

In 2001, we completed preparations for a product assessment system - scheduled for implementation in 2002 - that is intended to evaluate and reduce the environmental impact by integrating the above activities through our products. Furthermore, since April 1996, we have been pursuing activities regarding environmentally hazardous substances that have become part of the product assessment system.

#### Implementation of LCA

The LCA is a method of quantitatively assessing the various environmental impacts imparted by a product throughout its life cycle, which extends from resource extraction to manufacturing, sales, use and disposal.

Murata established its first LCA Sub-Committee in 1995. Using the results of an analysis of LCA data on our typical products, we prepared clear LCA guidelines and introduced them into our R&D process in 1999.

The items considered in an LCA assessment include carbon dioxide emissions, lead content, amount of principal raw materials consumed, the product and its production equipment.

The LCA data analysis revealed not only the energy consumed directly in manufacturing, but also the energy consumed indirectly by air conditioning and the like. As a result, we recognized anew the importance of energy conservation through initiatives such as co-generation.

See page 21.

#### Introduction of a Product Assessment System

The product assessment system is a method of assessing, at the design stage, a product's impact on the environment. As part of this system, Murata is seeking to reduce or eliminate the use of environmentally hazardous substances in its products and in the manufacturing process. See pages 14 and 26.

In particular, one important theme is the "lead-free" initiative, which has been developed as a dedicated project. See page 15.

In 2001, we established a Product Assessment Section Meeting based on the LCA Section Meeting mentioned above. We established a product assessment guideline that integrated various activities that previously had been undertaken separately.

Consequently, the assessment items are largely divided according to their relation to the product, the production process and the packaging, and all are subject to the "3Rs" (reduce, reuse and recycle). Moreover, the product assessment system is implemented at each product development stage. The system comprises an assessment standard and is structured to allow for feedback from the design stage in order to prevent any erosion of the standards. We remain committed to promoting environmentally conscious product development through the product assessment system.

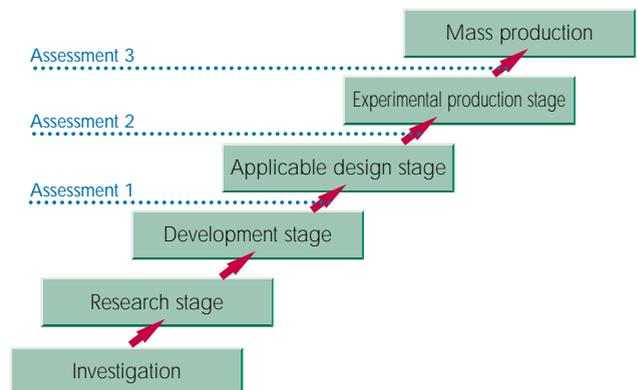
Sample LCA Data Sheet (inventory data)

Classification	Item	Unit	Process		Measurement	Total
			Cutting	Drilling		
Input	Energy consumption					
	Electricity	kW·h	0.13	12.32	5.08	76.09
		kJ	460	4434	18300	234900
	Fuel Gas	kJ	0	0	0	0
	Consumption of major raw materials					
	Material A	g	99.26	0	0	99.26
	Material B	g	0	0	0	70.43
Consumption of raw materials containing lead						
	Solder	g	0	0	0	58.60
	Others	g	0	0	0	0
Output	Exhaust emissions					
	CO <sub>2</sub> (direct)	g	0	0	0	0
	CO <sub>2</sub> (indirect)	g	21	2,033	838	12550

#### Product Assessment Items

Classification	Item
Product	Reduction of environmentally hazardous substances
	Reduction of main raw materials
	Compact
	Power conservation
	Green procurement
Production process	Reduction of environmentally hazardous substances
	Reduction of energy consumption
	CO <sub>2</sub> reduction
	Waste reduction
Reduction of regulated substances	Packaging
	Promotion of reduce, reuse and recycle

#### Product Assessment Process



## Environmentally Hazardous Substances in Products

Murata is actively incorporating the technology and developments for substituting or reducing environmentally hazardous substances in products to the greatest extent possible.

### Adoption of voluntary standards regarding the environmentally hazardous substances in products

In April 1996, Murata created a product regulation program for environmentally hazardous substances in products ("product regulation program"). This program is intended to reduce the use of environmentally hazardous substances in products. In February 2001, we revised the program after a consideration of changing circumstances. Currently we regulate 32 substance groups according to the product regulation program. We are limited to using only these specified substances, categorized by application, and parts containing these substances, and are applying our regulations according to four rankings: A (prohibited), B (voluntarily prohibited), C (reduce) and D (prepare to reduce).

The product regulation program also covers substances contained in packaging materials.

### The 32 substance groups of the voluntary regulation program for environmentally hazardous substances in products

Asbestos	Nickel and its compounds
Antimony and its compounds	Arsenic and its compounds
Ethylene glycolethers and its acetates	Beryllium and its compounds
Cadmium and its compounds	Benzene
Xylene	Pentachlorophenol (PCP)
Metal carbonyl	Polychlorinated terphenyls (PCTs)
Chromium and its compounds	Polyvinyl chloride (PVC) and its blends
Cobalt and its compounds	Polychlorinated biphenyls (PCBs)
Cyanides and Nitriles	Polybrominated biphenyl oxides (PBBOs)
Mercury and its compounds	Polybrominated biphenyls (PBBs)
Selenium and its compounds	Formaldehyde
Dioxins and Dibenzofuranes	Organotin compounds
Thallium and its compounds	Organophosphorus compounds
Tellurium and its compounds	Halogen compounds
Toluene	Foam polystyrene for packaging materials
Lead and its compounds	Heavy metals in packaging materials( Cd, Cr <sup>6+</sup> , Hg, Pb )

Chemical substance name/Rank

### Example of product regulation program

	A	B	C	D
Cadmium and its compounds	Resin material	All except resin material		
Mercury and its compounds		Mercury and its compounds		
Polyvinyl chloride (PVC) and its blends		Packaging materials used for shipping products. PVC and its blends containing Cd as a stabilizer	PVC and its blends containing Pb as a stabilizer	PVC and its blends containing stabilizers other than Cd and Pb

Details of regulation by ranking

- A: Prohibited... Prohibit containing the substances
- B: Voluntarily prohibited... Prohibit containing them in principle (prohibit after a given period of time for lead)
- C: Reduce... Reduce or eliminate content by specified time limit.
- D: Prepare to reduce... Research and prepare to reduce.

We are making progress in reducing the use of environmentally hazardous substances according to the product regulation program for existing products. In addition, we have established a system that can confirm compliance with the product regulation program during the design stage of products under development. As well, we are working to provide customers with products consisting of less environmentally hazardous substances.

Specifically, we have implemented lead reduction activities by organizing a project that targets the reduction and elimination of lead use.

See page 15.

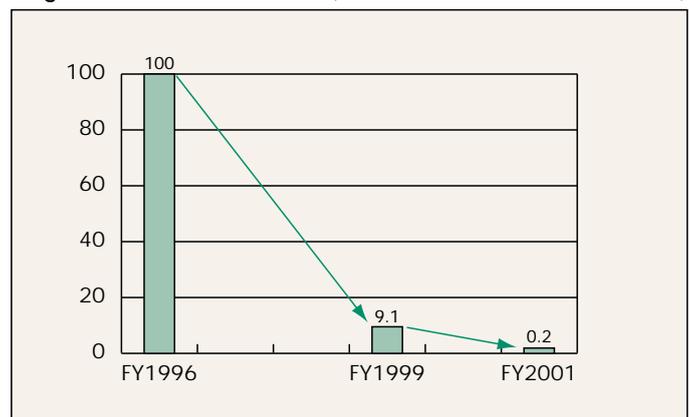
### Reduction and abolition of the use of environmentally hazardous substances in products

Below are examples of substances listed in the Murata product regulation program whose consumption has been either reduced or eliminated.

#### Cadmium and its compounds

As of the end of fiscal 2001, consumption of cadmium had been reduced to 0.2% of the amount consumed in fiscal 1996. The amount still in use at present is limited to essential applications (special application specification). The amount consumed is a mere 28 grams per month.

Progress in Cadmium Reduction (Amount consumed in FY1996 is indexed as 100.)



#### Polybrominated biphenyl oxide (PBBO)

This substance is used as a flame retardant for resins. We began reducing consumption of PBBO in 1989 before adopting the product regulation program. We do not currently use this substance.

#### Polyvinyl chloride (PVC) packaging material

We eliminated use of this substance in September 1994. Regulations in the U.S.A. and Europe specify that the total content of heavy metals (lead, cadmium, mercury and hexavalent chromium) in packaging materials must not exceed 100 ppm. Since January 1997, all our packaging materials have used materials that satisfy this regulation, even in regions where no such law exists.

## Addressing Environmental Preservation through Our Products

### Eliminating Lead

#### Eliminating Lead from Products

Murata's efforts to reduce lead have been implemented according to the product regulation program for environmentally hazardous substances in products. Specifically, in 1995 we established the "Lead-Free Solder Project," an initiative intended to introduce lead-free solder that was undertaken by our Technical Development Department and the Product Planning and Design Department.

#### The Lead-Free Solder Project

Within the electronic component industry, demand has been increasing for a lead-free approach, particularly through initiatives such as green purchasing, product assessment activities, lead-free solder assembly by electronic equipment manufacturers, and the WEEE\*<sup>1</sup> and RoHS\*<sup>2</sup> drafts of the EU directives.

Murata has long promoted numerous lead-reduction measures. Murata has made significant progress in its lead reduction efforts, including elimination of lead from the plating of terminals and from the surface of soldered terminals. Then, we began supplying lead-free and lead-reduced products to the market.

Murata's approach to reducing the lead content of its products largely addresses the following three categories of lead-containing parts.

\*1 WEEE(Waste Electrical and Electronic Equipment)

\*2 RoHS( The restriction of the certain hazardous substances in electrical and electronic equipment )

#### 1. Elimination of lead from terminal plating and solder on terminal surfaces

We started supplying products that use lead-free materials in plating and solder on terminal surfaces in April 2001. As of the end of March 2002, we had completed the preparation of substitutes for 75% of our products. We will complete the substitution for all our products by the end of December 2003.

#### 2. Reducing lead used for solder in products, for glass in electrode materials, and in stabilizers for polyvinyl chloride etc

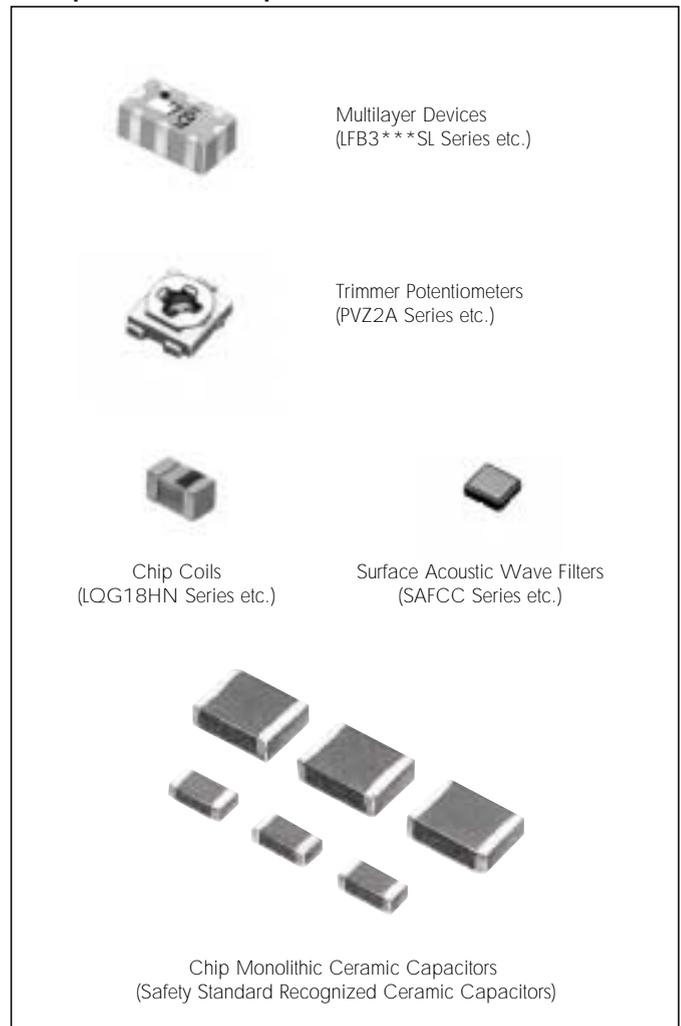
Working in cooperation with our suppliers, we intend to reduce or substitute the lead content in these areas by the end of December 2003. As for the glass used in October 1997 for thick film electrode materials, 23% of the thick film materials contained lead. But we have completed development of lead-free materials for all but 4% of the thick film electrode materials as of the end of March 2002.

#### 3. Research on the substitution of the lead contained in ceramics and some glass materials and research on alloys with lead-free materials

The present draft of the RoHS directive exempts the lead used in these parts from the ban, because it is technically difficult to substitute the lead in such parts with other materials. However, Murata will continue to review possible lead elimination from such parts through the research and development of relevant technologies.

Moreover, the technologies developed through the lead-free efforts were actively put into practice, applied patent, and some are licensed to other parties.

#### Examples of lead-free products



## Murata's Environmentally Conscious Products

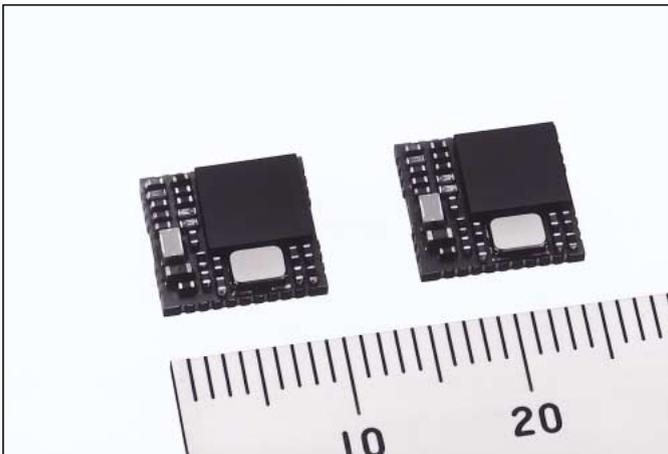
### Lead Free



Ultra-Compact Chip Monolithic Ceramic Capacitors

Murata has introduced ultra-compact (0.6×0.3 mm, 1.0×0.5 mm) chip monolithic ceramic capacitors meeting the specification for lead-free electrodes. As a result, we have developed a system for supplying all our ultra-compact chip monolithic ceramic capacitors (in sizes ranging from 0.6×0.3 mm to 5.7×5.0 mm) satisfying the specification for lead-free electrodes. Moreover, the same system has been applied to thermistors and many other products. [See page 15.](#)

### Compact

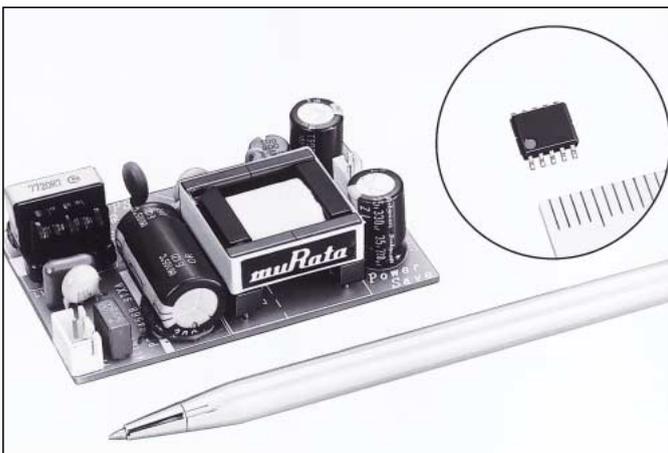


Ultra-compact Lightweight HCI Modules for Bluetooth® (Blue Modules™)

Developed with Murata's longstanding low-temperature co-fired ceramics and combining ceramic multilayer functional substrate technology and microwave circuit design technology, this module measures a mere 9.8×9.6×1.8 mm and weighs less than one gram. Boasting a roughly 40% reduction in both volume and weight, this module is much lighter and more compact than our conventional products.

As a result of this size reduction, this module contributes to a reduction in multiple environmental impacts through energy saving and reduced waste during manufacturing as well as space-saving and reduced consumption of principal raw materials.

### Power Saving



Energy-saving Switching Power Supply

Murata has long been focusing on the development of a comprehensive high-efficiency power supply. Specifically, we have been marketing an energy-saving power supply with an improved standby efficiency rate thanks to the use of a proprietary circuit design that reduces standby power consumption.

With this power source, we have succeeded in limiting power loss to, for example, less than 150 mW, a mere one-tenth of the power loss of conventional devices, when 500 mW of standby power is supplied to an electronic device. This represents the lowest standby power loss in the industry.

## Addressing Environmental Preservation through Our Products

### Reducing Packaging Materials and the Consumption of Energy in Physical Distribution

Since 1995, Murata has been working to reduce the environmental impacts accruing from distribution and from packaging materials as they relate to our business activities. We have addressed this issue from two sides: we have devised a packaging material strategy intended to conserve the resources consumed by packaging materials as well as a distribution strategy intended to conserve the energy consumed in distribution activities.

#### Promoting the Adoption of Bulk Case Packaging

The main initiative in our strategy to reduce packaging material at Murata involved switching over the chip component packaging method from tape to bulk cases. The principal advantage of bulk casing is that it eliminates the need for the paper tape used in tape packaging. Moreover, bulk case packaging offers the advantage of a more compact form, as the packaging shape allows for the storage of a larger number of chip components in a smaller space. Not only does this approach contribute to environmental preservation, it also enhances productivity and increases the available storage space.

However, the introduction of the bulk casing involved major challenges such as the remodeling of chip placement equipment, improvement of bulk feeder, and the increased dimensional accuracy of the components. Most notably, the need to supply the components in a continuous line resulted in increased structural complexity in the component supply section. In addition, technical and quality problems arose. However, we were able to overcome these technical problems through ongoing development and evaluation with the cooperation of the customers and equipment manufacturers. As well, in order to reduce the amount of used plastic, we collected used bulk cases for reuse.

We intend to continue implementing the switchover from tape to bulk cases.

#### Details of the bulk case

Bulk case dimensions:

110×36×12 mm (L × W × H)



#### Promoting the Adoption of Bulk Cases

An industry standard specification for bulk cases was adopted in March 1992. Although Murata holds the industrial property rights for this type of bulk case, we are encouraging its widespread adoption by licensing it free of charge. We have declared our intention to extend this policy to companies in other countries as well.

Building on the "Bulk Summit" conference in the U.S.A. in 1999, Murata has taken part in planning "Bulk Summit Japan" in 2000 and 2001. Furthermore, we have aggressively promoted the spread of bulk casing from our position as a leader in the industry. We have also proposed a small bulk case that is more suited to accommodating orders of smaller quantities. It can accommodate chip components in sizes as small as 0.6 x 0.3 mm.

#### Promotion the Reduction and Reuse of Packaging Materials

Our green innovations include more than just the switchover to bulk cases. For example, since 1996 we have reduced the number of cardboard boxes consumed by introducing larger cardboard boxes for taped-packaged products. Additionally, we began reusing tape reels as well as the boxes for unit load used in the delivery to customers. By 2001 we had reduced the amount of packaging material used per unit of net sales by 11% compared with 1995 levels.

#### Reducing Energy Consumption during Transport

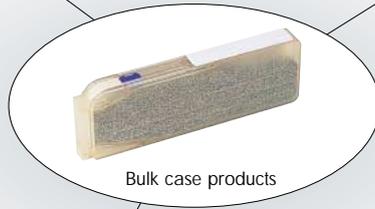
In 1996, we began to address the issue of energy conservation in distribution. To reduce the fuel consumption of the trucks transporting Murata's products, we have promoted energy-conserving driving practices (such as reducing the rpm at which transmission shifts occur and minimizing engine idling time), reduced the transportation distance (by reviewing transit routes), and promoted a modal shift from trucking to railroad. As a result, by 2001 we had improved fuel consumption per unit of mileage by 21% compared with 1995 levels.

By continuing with the policies we have adopted to date, such as promoting energy-conserving driving practices and reduced transportation distances, we will move closer to our goal of converting to the use of energy-conserving vehicles.

## Advantages of Bulk Cases

### Increased productivity

- Reduced stop time for chip placer
- Simplified replenishment of parts



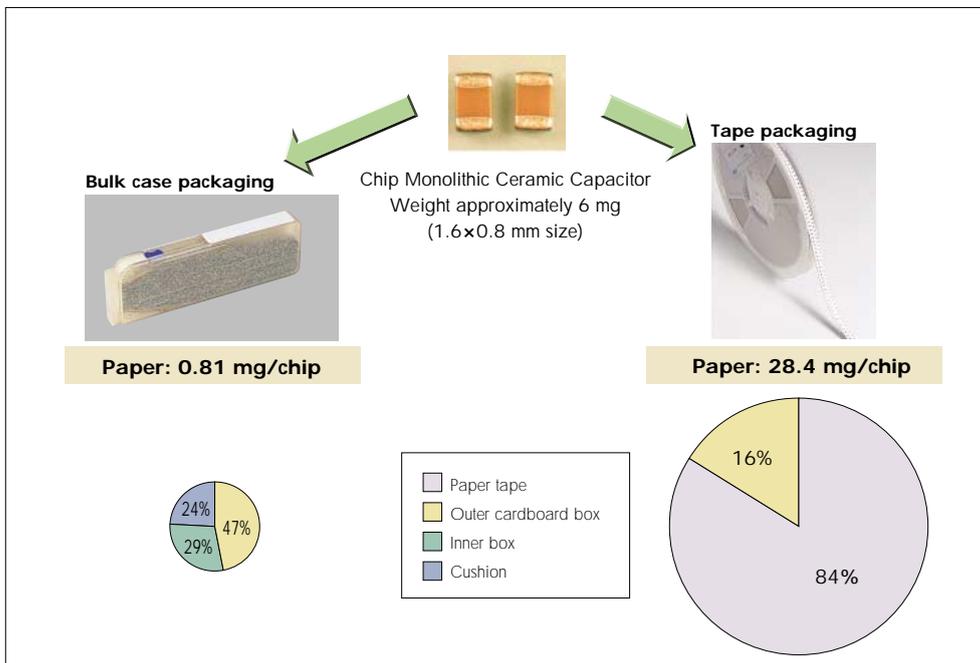
### Reduced storage space requirements



1/20 of tape packaging

### Environmental preservation

- Reduction in amount of paper consumed 1/30 of tape packaging



- Easily recyclable packaging material

- Reduced energy consumption during transportation 1/6 of tape packaging



Bulk-case-packaged products



Tape-packaged products

Note: Based on calculation using the data of 1.6×0.8 mm size.

# Addressing Environmental Preservation through Our Products

## Green Procurement

If a Murata product is to be environmentally benign, the materials supplied for making that product, as well as the process by which the product is manufactured, must be environmentally benign as well.

In 2001, Murata distributed its "Green Procurement Guide for procurement suppliers" within Japan. This approach has served to publicize Murata's basic stance toward environmental impacts abatement. We also carry out the following material procurement activities.

### Evaluating the "Greenness" of a Supplier's Activities

We evaluate and confirm the environmental conservation efforts of domestic suppliers before we undertake any transactions regarding the purchase of the following: materials incorporated in Murata's products; materials used in the mass production process; materials used for product packaging; and facilities.

As for suppliers with whom we maintain an ongoing relationship, we examine their environmental management system and impact on the environment at fixed intervals in addition to evaluating their services on the basis of Q (quality), C (cost) and D (delivery).

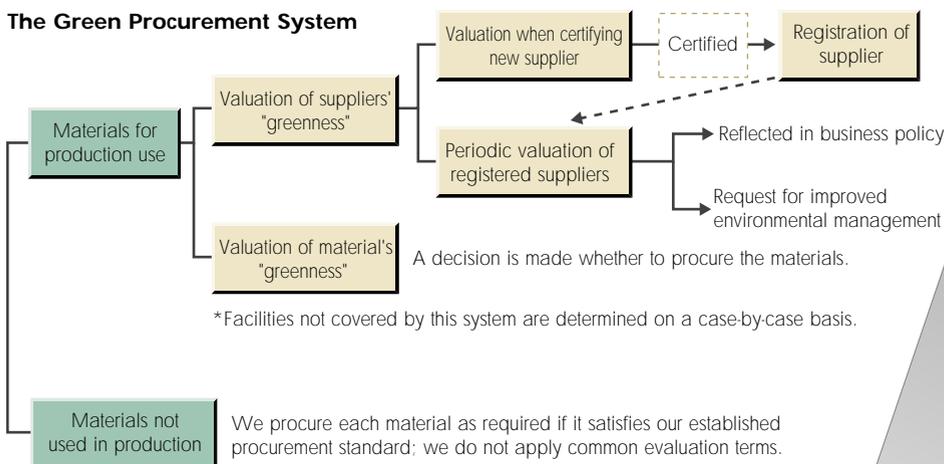
If our survey and evaluation of a supplier reveal any inadequacies in the area of environmental issues, we approach them and suggest improvements.

### Evaluating the "Greenness" of Materials

Regarding the various materials that are used in the manufacture of Murata's products, such as raw materials; materials used in the mass production process; and materials used for the packaging of Murata's products, we undertake an environmental impact assessment (of the "greenness" of the material), evaluate the material against Murata's standard for the material itself, and weigh the advantages and disadvantages of adopting the material.

For other goods not directly related to the production, such as office supplies and equipment; and purchases related to amenities, Murata has promoted green procurement by establishing voluntary standards to ensure environmentally conscious purchases and applications.

### The Green Procurement System



1. Have you acquired third-party certification of registration with the environmental management system standard (ISO 14001)?
2. Has your company adopted a documented corporate guideline or policy regarding the environment?
3. Has your company adopted a documented voluntary environmental management standard or improvement targets?



村田製作所グループ 仕入先グループ		
貴社名		当社使用欄
取引先コード	( )	評価結果
部署名		
責任者名		承認
連絡先 TEL		確認
FAX		
窓口		
年 月 日		
調査分類	説明	回答
管理体制	(1) 環境マネジメントシステム規格(ISO14001)の認証を取得していますか。 ※当該部門の回答が「1取得済み」の場合は、説明(2)~(4)の回答記入は不要です。	1 取得済み (取得日 年 月 日 審査機関 認証No. ) 2 22年以内に取得予定 (取得予定 年 月 審査機関 ) 3 取得予定なし
	(2) 文書化された環境に関する企業理念もしくは方針がありますか。	1 あり 2 ない
	(3) 文書化された自主的な環境管理基準もしくは改善目標がありますか。 (結果的に環境に資する活動が行われているか、と) いふことではなく、環境保全を目的とした目標を定めているかをお聞かせいたします。)	1 あり (主なもの ) 2 ない
	(4) 文書化された環境に関する方針や目標のための実施計画がありますか。	1 あり (主なもの ) 2 ない

- ### Details of Evaluation
- Supplier's**
- Environmental management system
  - Circumstances of environmental implementation
  - Environmental impact
- Material purchasing**
- Status of chemical substances

# Incorporating Environmental Preservation in Business Activities

In parallel to the effort to reduce the environmental impacts of its products, Murata also places priority on reducing the environmental impacts that results from its corporate business activities. This initiative encompasses the appropriate management of all chemical substances used; efforts to prevent global warming; resource conservation; and waste reduction.

## Management of Chemical Substances

### Introduction of an inspection and registration system for chemical substances

In 1998, Murata established a chemical substance inspection and registration system. Since 2000, we have been using this system to enforce self-management of chemical substances throughout the entire domestic group.

This system requires that we obtain an MSDS (Material Safety Data Sheet\*1) for each chemical substance that we use in the mass-production of our products. Before using a substance, Murata Manufacturing's Personnel and Environmental Staff Departments subject it to the required staff inspection and plant inspection. This step allows us to establish compliance with chemical laws in force in Japan and other countries, environmental laws, worker health and safety laws, and Murata's own voluntary regulations. We also verify compliance with local regulations.

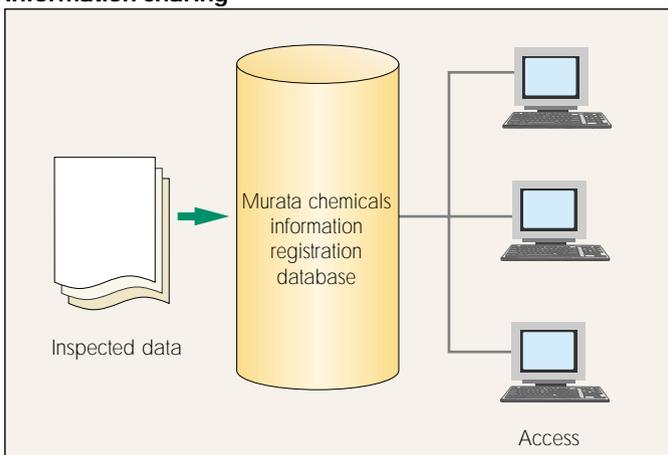
Only those chemical substances that pass such an inspection are issued a unique number. The purchase and handling of a substance is possible once the substance has been registered in Murata's database. In this way, we ensure the proper use of chemical substances and support the manufacture of products having little environmental impacts.

\*1 To help ensure the safe handling of chemical substances, this document provides indispensable information such as the name of the substance, its supplier, its hazard and toxicity, the safety measures required in its handling; and proper emergency measures in the event of an accident.

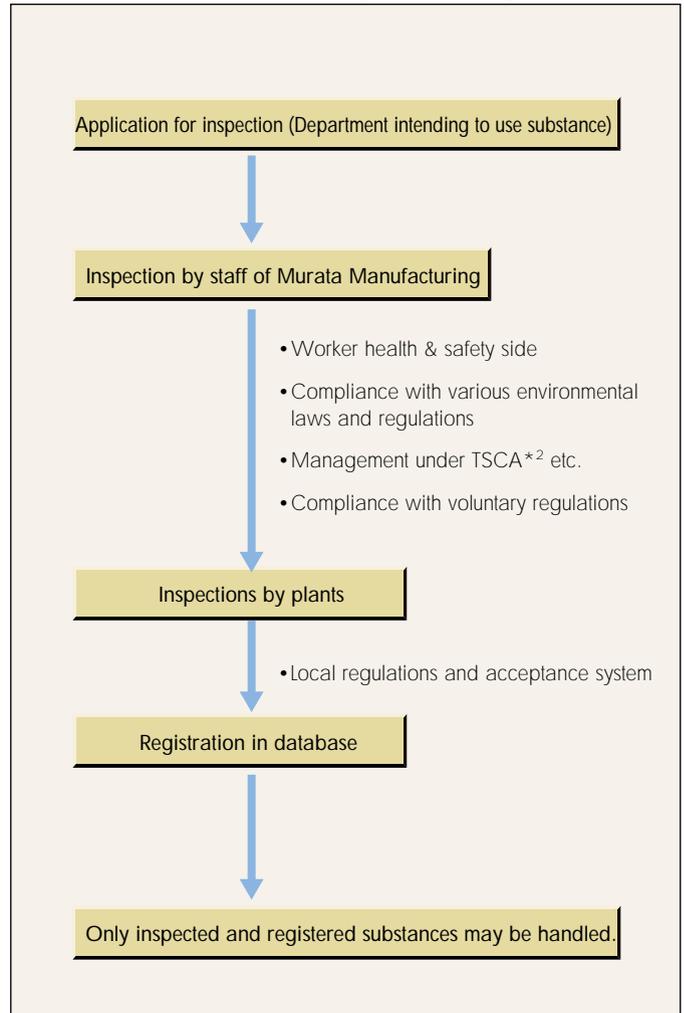
### Features of Murata's Chemical Inspection & Registration System

- Observance of laws and regulations ⇒ Inspection prior to use
- Avoidance of hazardous substances ⇒ Only registered substances shall be handled (purchased, manufactured, stored and sold).
- Information sharing ⇒ Registration in database

### Information sharing



### Flow of Chemical Substance Inspection & Registration



\*2 The Toxic Substances Control Act is a U.S. law regulating the manufacture, handling and application of chemical substances. It is intended to protect human health and the environment from toxic substances. When producing a new chemical or exporting a chemical to the U.S.A., we must first submit safety data and other necessary information and inspection reports to the EPA (U.S. Environmental Protection Agency).

## Addressing Environmental Preservation through Our Business Activities

### Prevention of Global Warming

Greenhouse gases such as carbon dioxide that are emitted during production activities can have an important effect on everyday life, as they may contribute to global warming that leads to climate change and rising sea levels. For its part, Murata is instituting energy saving measures intended to prevent global warming.

### Energy Conservation Activities to Date

At Murata, we have been aggressively promoting energy saving in plant management through the two perspectives of utility facilities and production facilities. In spite of these efforts, however, domestic carbon dioxide emissions per unit of net sales (carbon dioxide emissions per basic unit of net sales) for fiscal 2001 worsened by 32% compared to the level for fiscal 1990. We believe that the main reasons for this increase are a drastic reduction in the unit price of products as well as a drop in production which led to shortfall in energy saving targets focused on carbon dioxide emissions.

Nonetheless, specific facilities have achieved good results, especially following the introduction of co-generation\*<sup>1</sup> (thermoelectric power supply) systems. As well, improvements to production facilities posted very good results.

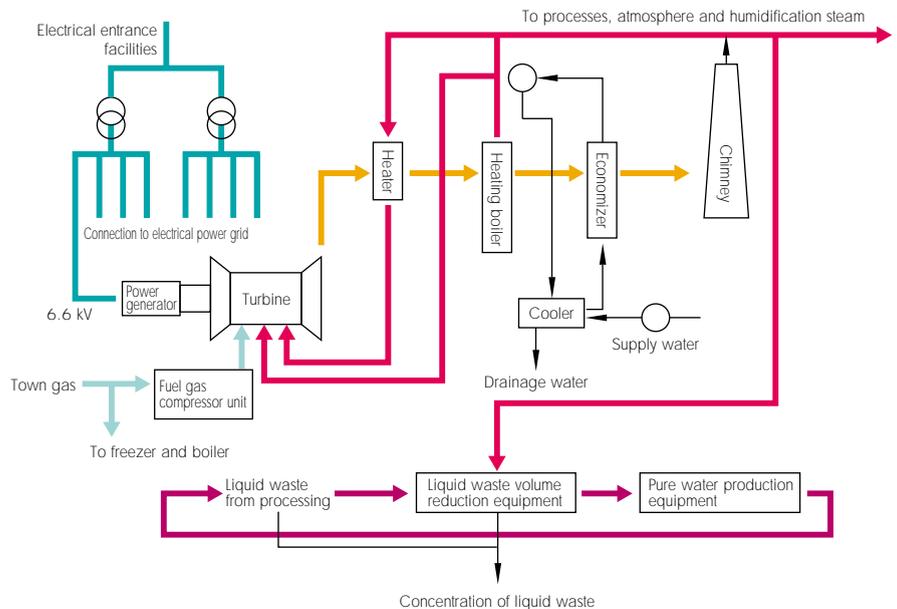
\*<sup>1</sup> A system that provides air conditioning by utilizing waste heat from power generators. By obtaining two or more energy forms from one fuel source, this system raises the efficiency of energy generation and reduces carbon dioxide emissions.

### Introduction of a Co-generation System

We introduced a co-generation system in our Yasu Plant in 1999. While a 6,000 kW class power generator provides about 80 percent of the power consumed by the plant, the waste steam is also effectively used for air conditioning in production activities. We also took the opportunity presented by the introduction of this system to undertake a shift in fuel source for power generation. While we had previously been using electricity and liquefied petroleum gas (LPG), we undertook a major shift to liquefied natural gas (LNG), which is known for its low carbon dioxide emissions, as a fuel source for our co-generation system. As a result, we have reduced our carbon dioxide emissions by about 22% (crude oil equivalent 706 kL). Moreover, we have been able to use the steam heat source, which had become redundant, to effect a drastic reduction in the volume of the industrial liquid waste. As a result, we were able to reduce the amount of waste generated by about 85% (23,600 cubic meters).

We are also proud that, following the introduction of the system, Murata was recognized in 1998 by the New Energy and Industrial Technology Development Organization (NEDO) as a leading enterprise introducing model rationalized energy facilities.

### Schematic of co-generation system and waste liquid volume reduction facilities



Co-generation system (Yasu Plant, Murata Manufacturing Co., Ltd.)



Liquid waste volume reduction equipment (Yasu Plant, Murata Manufacturing Co., Ltd.)

### Improvement of Heat Treatment Equipment

Heat treatment equipment consumes much of the energy required for production. Murata long ago developed a proprietary technology for heat treatment equipment and has even incorporated energy conservation innovations in various devices and applications. As a result, we have made progress in the supply of highly energy-efficient equipment. Specifically, by decreasing the amount of heat conduction loss through the wall of a heat treatment equipment (firing furnace), we have succeeded in improving energy efficiency. This following is an example of an innovation that has dramatically decreased our energy consumption.

### Improvement in the Furnace Wall Insulation of the Heat Treatment Equipment (Firing Furnace)

By specifying a material with low thermal conductivity for the wall of the heat treatment furnace, we were able to decrease the amount of heat conduction loss through the furnace wall by more than 50%. We will continue to apply this technique. By aggressively adopting new types of equipment and thermal insulation and devising combinations of thermal insulation with varied properties, we are making progress in decreasing the heat transfer loss while improving energy efficiency.

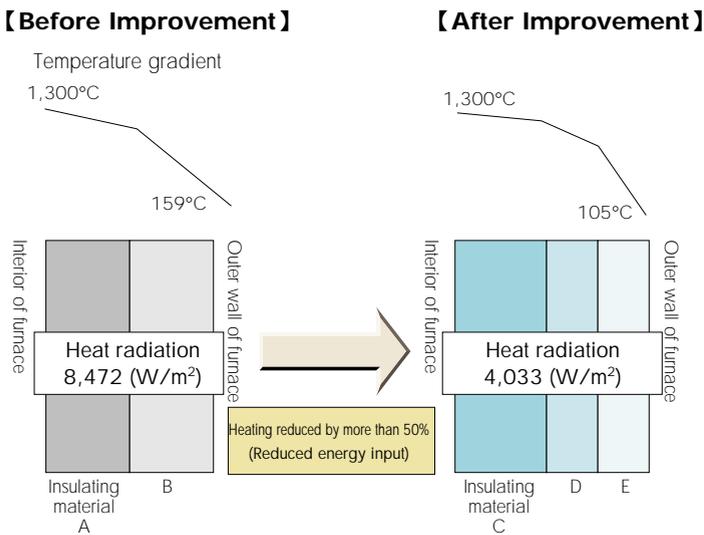
### Enhancing Energy Saving

With the aim of achieving further energy savings, we plan to reduce the carbon dioxide emissions per basic unit of net sales by 30% compared with fiscal 1990 levels by the end of fiscal 2010. As a specific initiative, we are advancing the following policies company-wide with a focus on specialist technicians and energy managers.

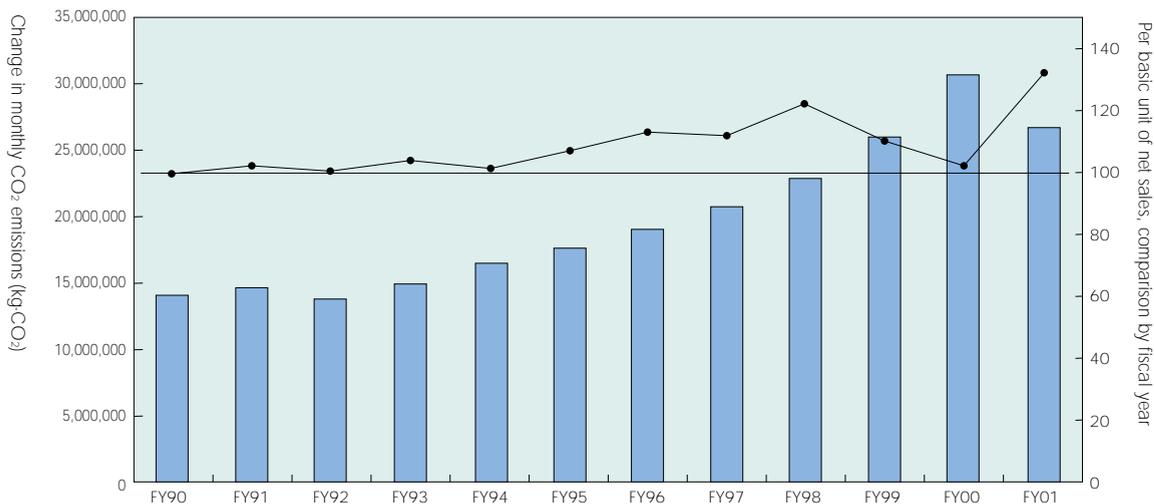
- Innovations in utility equipment
- Energy saving innovations for heat treatment equipment and effective use of waste heat
- Improvements in facility productivity and innovations in heat treatment technology
- Development of more compact products

In addition, we will continue to seek reductions in the use of chemical substances imparting an environmental impact in the manufacturing process. This will apply even to countermeasures for the non-energy group of greenhouse gases - such as PFCs, HFCs, SF<sub>6</sub> and the like - which have been listed as subject to regulation at the COP3 (the Third Conference of Parties to the United Nations Framework Convention on Climate Change)

See page 26.



### Transition in carbon dioxide emissions and basic unit of net sales in fiscal 1990 (Totals in Japan)



Note: The conversion of energy consumption to carbon dioxide emissions is calculated according to Murata's own standards.

## Addressing Environmental Preservation through Our Business Activities

### Conservation of Resources and Reduction of Waste

Murata is working to reduce - to as close to zero as possible - the environmental impacts accruing from waste produced as a result of our business activities. Our goal is to contribute to the development of a "recycling society" by reviewing production processes, minimizing the disposal of waste matter, and promoting recycling and reuse.

#### Elimination of Incinerators

By 1998, we had eliminated incinerators from all 18 domestic plants and subsidiaries that had maintained incinerators. Although most were small-scale units outside the scope of laws and regulations, we voluntarily abolished them to reflect our commitment to preventing the release of dioxins. In parallel with this effort, we sought the cooperation of paper manufacturers to promote the recycling of paper, which represented most of what was burned in the incinerators.

#### Recycling of Films Attaching Ceramics

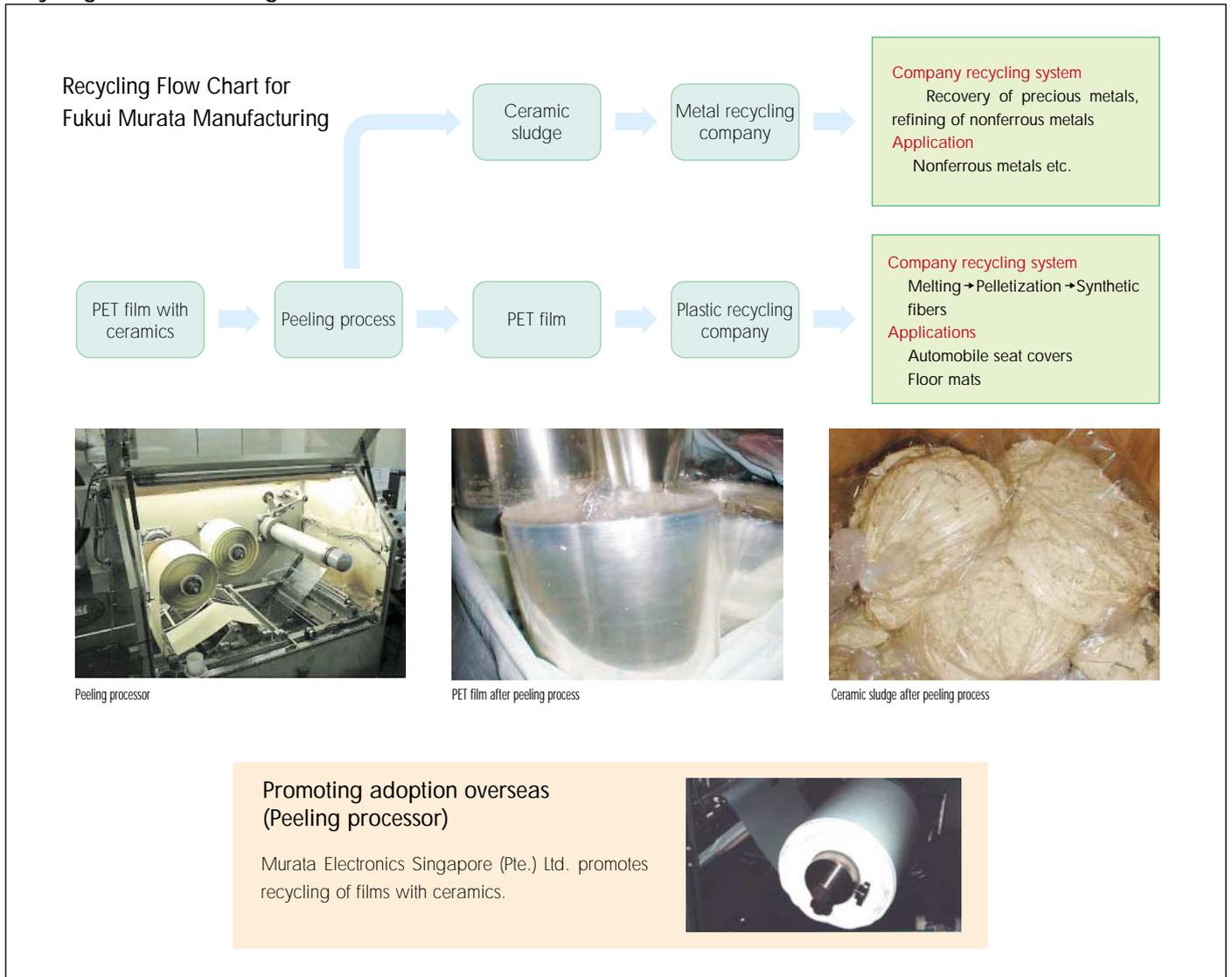
Initially, we disposed of soiled ceramic PET film in landfills, but in 1997 Fukui Murata introduced a peeling process targeting ceramics containing mainly precious metals. We then promoted recycling of the plastic after all dirt had been removed. Beginning in 2000, we instituted the same practice in our Singapore plant.

#### Introduction of Liquid Waste Evaporation Equipment

In 1999, we introduced a liquid waste evaporation equipment at our Yasu Plant that makes use of the waste heat from our co-generation system. This innovation has enabled us to concentrate liquid waste and reduce the amount discarded externally by about 85% (23,600 cubic meters).

By 2001, we had introduced liquid waste condensers at our Fukui Murata and Izumo Murata plants, thereby reducing the output of liquid waste to one-twentieth of these plants' outputs before the condensers were introduced. In addition, Toyama Murata Manufacturing has introduced a sludge dryer that has succeeded in reducing sludge output by about one-half.

### Recycling of Films Attaching Ceramics



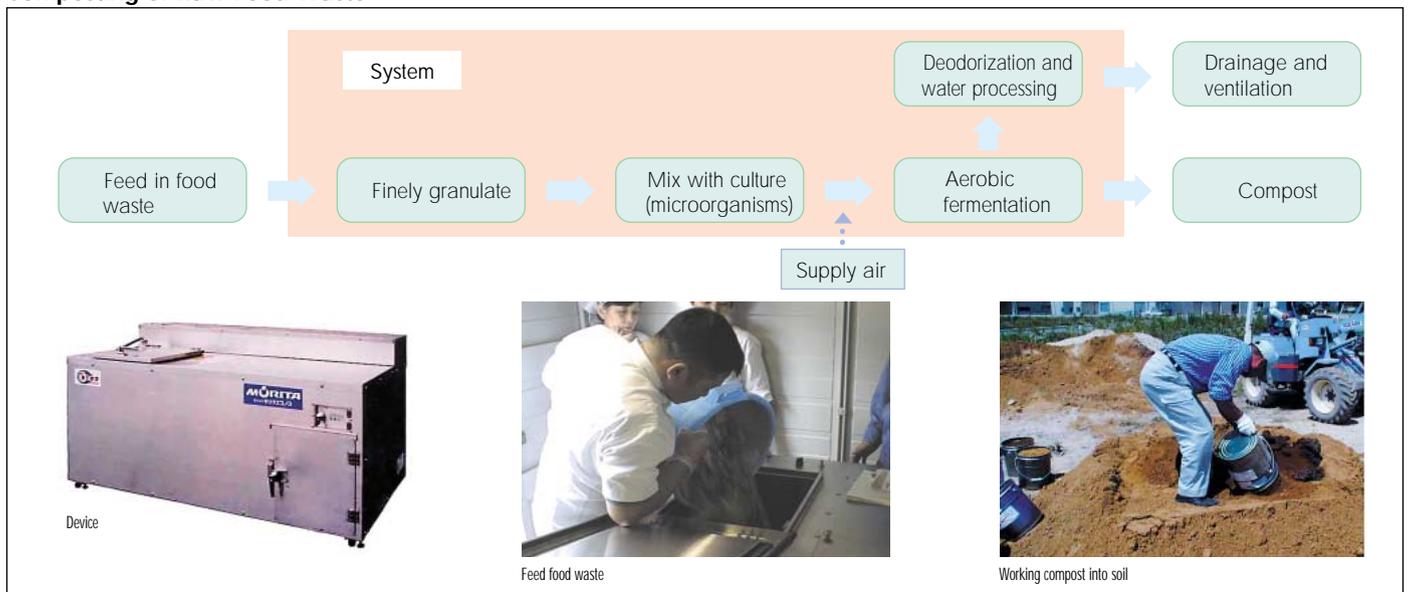
### Towards Zero Disposal of Raw Food Waste from Dining Halls

Our Japanese plants with employee dining halls and kitchens generate appreciable amounts of raw food waste. To address this issue, we began introducing facilities for composting this raw waste in 1996, and by January 2001 we had completed introducing such facilities in all 18 plants and subsidiaries (representing a total investment of ¥69 million).

The raw kitchen waste generated within Murata's domestic operations totals about 200 metric tons annually. As a result of this initiative, however, we have succeeded in reducing this volume to a mere 20 to 40 metric tons. Furthermore, because we compost the

remainder, we have been able to discontinue all external disposal of food waste; we now use the resulting compost on company grounds as part of our green landscaping efforts.

### Composting of Raw Food Waste



### Toward Zero Emissions

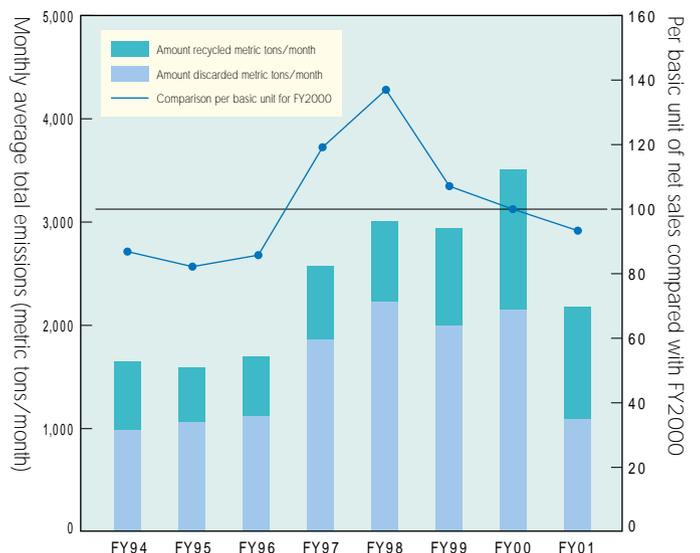
In fiscal 2001, Murata's monthly average total emission\*1 of domestic waste amounted to 2,193 metric tons, which represents a 7% reduction compared with the amount per basic unit of net sales for fiscal 2000.

The domestic recycling rate totaled 53.3% in fiscal 2001, an improvement of 15 points compared with the results for fiscal 2000 (38.3%). This result was largely attributable to distillation recycling of waste oil (waste organic solvents) and increased recycling of waste plastics in the form of refuse derived fuel. As a future objective, we are targeting complete recycling and zero landfill waste\*2 by the end of fiscal 2003.

\*1 Represents all waste (include salvage) discharged from plants. We plan to reduce this amount.

\*2 Represents zero direct landfilling of waste as well as zero landfilling of residual waste and sludge remaining after waste processing (such as incineration and neutralization).

### Total emissions of waste per basic unit of net sales compared with results for fiscal 2000 (domestic total)



## Addressing Environmental Preservation through Our Business Activities

### The Pollutant Release and Transfer Register (PRTR)

#### Utilizing databases

Murata has compiled a database that contains information on the chemical substances handled within our domestic plants. We employ a system that enables us to obtain and manage the application situations of individual chemical substances quickly and easily.

In compliance with the Pollutant Release and Transfer Registry law, we use this system to calculate the amounts of chemicals released and transferred.

The law stipulates 354 substance groups subject to reporting. Domestically, between April 1, 2001, and March 31, 2002, the Murata group handled more than five metric tons of 14 substance groups, including toluene, xylene, and lead and its compounds. Detailed quantities are provided in the table below.

#### Reduction of Release

Murata has long taken steps to reduce environmental emissions, such as introducing facilities for removing hazardous substances; modifying production process; improving operations; and promoting conversion to substitute substances. In the future, will make practical use of PRTR data and, for chemical substances released in large amounts, we will assign target values and implement additional reductions.

#### Domestic total amounts of pollutants released and transferred subject to the PRTR law

(metric tons/year)

Gov't-issued No.	Substance	Released				Transferred		
		Atmospheric release	Released to public bodies of water	To soil	Landfilled	Released to sewerage	Transferred to waste	Transferred to recycling
30	Bisphenol A liquid epoxy resin	0.8	0	0	0	0	2.1	0
63	Xylene	0.7	0	0	0	0	15.5	0.1
64	Silver and its water-soluble compounds	0	0	0	0	0	0.5	7.3
202	Tetrahydroxymethyl anhydrous phthalic acid	0	0	0	0	0	0.1	0
227	Toluene	20.5	0	0	0	0	220.0	385.9
230	Lead and its compounds	0.5	0	0	0	0	19.4	124.4
231	Nickel	0	0	0	0	0	12.2	0.2
232	Nickel compounds	0	0	0	0	0	12.6	2.6
243	Barium and its water-soluble compounds	0.2	0	0	0	0	294.4	63.6
253	Hydrazine	0	0	0	0	0	3.2	0
270	Di-n-butyl phthalate	0	0	0	0	0	1.3	0
272	Bis-2-ethylhexyl phthalate	0	0	0	0	0	9.9	0
310	Formaldehyde	0.6	0	0	0	0	0	0
311	Manganese and its compounds	0	0	0	0	0	1.4	0.1

The above data covers the period from April 1, 2001 to March 31, 2002.

The PRTR law stipulates reporting of the above-stated substances when more than five metric tons are handled per year.

Amounts of less than 100 kilograms are rounded up.

## Environmentally Hazardous Substances in Production Process

### Eliminating Ozone-Depleting Chemicals (ODCs)

The "Montreal Protocol on Substances That Deplete the Ozone Layer," signed in 1987, set forth a schedule for the elimination of ODCs. At one time, Murata used ODCs as cleansers. However, we have adopted strategies such as process modifications and the introduction of substitute cleaners. We also promoted a campaign through which our purchasing department suggested changes to our material suppliers. As a result, we were able to eliminate the use of ODCs prior to the Montreal Protocol, including among the suppliers to our material purchasing department.

Regarding specified fluorocarbons, we eliminated the use of 1,1,1-trichloroethane in March 1993 and HCFCs (a fluorocarbon substitute) in December 1995.

### Elimination of Chlorinated Organic Solvents

Because chlorinated organic solvents such as trichloroethylene, tetrachloroethylene and dichloromethane are inexpensive and nonflammable, Murata has used these excellent cleaners for the removal of fats and in cleaning processes. Also, we have a history of partially adopting these substances as substitutes for ODCs.

However, we became aware that chlorinated organic solvents have a significant effect on the environment, causing air pollution, water pollution and contamination of soil and groundwater. Therefore, following the elimination of ODCs in May 1993, we adopted an independent policy to eliminate the use of chlorinated organic solvents. As a result, we eliminated use of these substances at all but one facility as of the end of

1995, and achieved complete elimination by March 1998.

Furthermore, in June 1997 we extended this policy to include raw material suppliers to our purchasing department. We sought their cooperation and adjustments toward the goal of eliminating the use of these substances as of March 1999. To date, most of our suppliers have extended their cooperation and complied with the elimination of these substances.

### Adoption of Voluntary Standards for Environmentally Hazardous Substances in Production Process

Among the chemical substances used in processing, those that have the possibility of imparting an environmental impact have been subject to Murata's own voluntary regulation standards, which were established in November 1997. We are targeting the reduction and elimination of substances specified in our product regulation program.

As for existing processes, we are implementing reduced use and release based on our voluntary regulation program. As for environmentally hazardous substances used in new processes, we are studying reduced usage and release of these substances.

Moreover, in May 2002, we adjusted our voluntary regulation program following an examination of the laws and regulations and the trends toward voluntary response within the electrical and electronics industry.

As part of these revisions, and especially because Murata uses volatile organic chemicals such as toluene and xylene in relative abundance, we have adopted measures to reduce the release of these substances into the atmosphere.

### Voluntary Regulation Program for environmentally hazardous substances in production process

Ranking		Target Substance	
A	Prohibited (41 substance groups)	•Asbestos	• Trichloroethylene
	Any application prohibited	•Cadmium and its compounds (limited to resins)	• Halon
B	Application prohibited within a specified period (23 substance groups)	•Dioxins	• Benzene
	Prohibited after a specified period	•White lead	• CFCs
C	Reduce emissions (22 substance groups)	• Acrylonitrile	• HCFCs
	Reduced emissions planned	• Arsenic and its compounds (excluding semiconductors)	etc.
D	Prepare to reduce emissions (45 substance groups)	• Cadmium and its compounds (excluding resins)	• Organic lead
	Control emissions and voluntarily prepare to reduce emission	• Mercury and its compounds	• Hexavalent chromium compounds
D	Control emissions and voluntarily prepare to reduce emission	• Acetaldehyde	• Lead and its compounds (used in some ceramics, solder, etc.)
		• Chloroform	• Toluene
D	Control emissions and voluntarily prepare to reduce emission	• Cyanide compounds	• Xylene
		• Formaldehyde	• PFCs
D	Control emissions and voluntarily prepare to reduce emission	• Nickel sulfate	etc.
		• Zinc and its compounds	• Lead and its compounds (used in some ceramics, glass, alloys, etc.)
D	Control emissions and voluntarily prepare to reduce emission	• Chrome and its compounds	• Arsenic and its compounds (application limited to semiconductors)
		• Copper and its compounds	etc.
D	Control emissions and voluntarily prepare to reduce emission	• Nickel powder	
		• Methyl ethyl ketone	

## Addressing Environmental Preservation through Our Business Activities

### Measures to Control Soil and Groundwater Contamination

#### Elimination of trichloroethylene and the like

In 1983, the Environment Agency (currently the Ministry of the Environment) first identified chlorinated organic solvents such as trichloroethylene as potentially carcinogenic. Recognizing this as an important issue, Murata began taking steps toward eliminating the use of chlorinated organic solvents such as trichloroethylene. By the time groundwater permeation was prohibited according to the terms of the 1989 Water Pollution Prevention Law, 17 of Murata's 22 production plants and subsidiaries had ceased using trichloroethylene. Furthermore, by 1995, four of the remaining five plants had eliminated the use of chlorinated organic solvents, with the remaining plant continuing use of such solvents because of the product preferences of a particular large customer. By March 1998, however, use of such solvents had been eliminated throughout the company. We can boast that, among all companies using chlorinated organic solvents, our achievement was exceptionally rapid.

In 1991, in parallel with this countermeasure, Murata introduced up-to-date technology that enabled the Company to undertake a factual survey of soil and groundwater contamination in all plants.

As a result of this effort, it was concluded that 14 of the Company's 36 plants and subsidiaries had to institute remediation measures to remove contamination by chlorinated organic solvents.

#### Implementing early-stage remediation (decontamination) countermeasures

We have instituted purification facilities on polluted sites and, wherever it was deemed necessary as part of the cleanup operation, we drilled wells along the borders of the sites of plants and subsidiaries. We have also prevented the spread of contamination beyond the sites by actively cleaning polluted soil and groundwater by means of strong vacuum extraction and the activated carbon absorption process\*<sup>1</sup> and by the water pumping, aeration, and activated carbon absorption process.\*<sup>2</sup>

Regarding our prior use of chlorinated organic solvents, we sought to document the results of our survey and countermeasures. Thus, since 1991, we have undertaken detailed soil and groundwater pollution surveys and have instituted a voluntary response. The survey and cleanup measures adopted by Murata are implemented with the most advanced technologies available. Furthermore, we reported our progress to the government and ceased submission of government reports in 1998.

#### Preventing the migration of pollution beyond plant sites

Table 1 shows the state of progress of the cleanup. One plant (Toyama Murata) has completed its cleanup, while 13 plants are continuing with their cleanup operations. Each plant is remediated by concentrating the local pollutants in wells drilled along the border of the site. As a result, we believe that this approach currently prevents any pollution from migrating beyond the plant sites. Moreover, two plants (the Fukui Murata Takefu Plant and Kanazu Murata Kanazu Plant) have already satisfied the environmental standard, and these plants are preparing to conclude their remediation operations.

#### Allocating reserves to cover all remediation (decontamination) costs

Completion of all remediation (decontamination) measures entails very high countermeasure costs. For business accounting purposes, Murata has completed a trial calculation of the full cost of remediation measures to ensure all contamination has been removed. As a result, we have appropriated a reserve as a credit (Table 2).

**Table 1. State of groundwater remediation**

(mg/ℓ)

Plants and Subsidiaries	Substance (Environment Standard Value)	Trichloroethylene (0.03 max.)	Cis-dichloroethylene (0.04 max.)	Remarks
Murata Manufacturing Co., Ltd., Head Office, Nagaoka Plant		0.349	0.011	
Fukui Murata Manufacturing Co., Ltd., Takefu Plant		0.015		Preparing for completion of cleanup
Fukui Murata Manufacturing Co., Ltd., Shirayama Plant		2.249	0.460	
Fukui Murata Manufacturing Co., Ltd., Miyazaki Plant		1.127	0.212	
Asuwa Electronics Industries, Ltd.		0.436	4.125	
Iwami Murata Manufacturing Co., Ltd.		0.140	1.964	
Wakura Murata Manufacturing Co., Ltd.		N.D.		
Himi Murata Manufacturing Co., Ltd.		N.D.	N.D.	
Kanazu Murata Manufacturing Co., Ltd., Kanazu Plant		N.D.		Preparing for completion of cleanup
Kanazu Murata Manufacturing Co., Ltd., Natsume Plant		0.203	0.109	
Hakui Murata Manufacturing Co., Ltd.		0.061	0.187	
Hakui Murata Manufacturing Co., Ltd., Togi Plant		0.242	0.379	
Toyama Murata Manufacturing Co., Ltd.		N.D.		Cleanup completed
Murata Electronics North America State College Operation		Trichloroethylene (0.005 max.)	Cis-1,2-dichloroethylene (0.07 max.)	
		0.013	0.014	

1) Data are average values from April 2001 to March 2002.

2) Data show the average values for downstream groundwater in all wells drilled along the border of a site.

3) We established the apprehended area in order to prevent migration of pollutants beyond the site, and are undertaking remediation efforts.

4) "Not detectable" means the measured quantity is below the lower limit of detection.

5) The diagonal line indicates that the site is deemed free from contamination.

**Table 2. Cost of soil and groundwater remediation**

(Millions of yen)

Total for FY1991-FY2001		Estimate for FY2002 and later		Total	
Nonconsolidated	Consolidated	Nonconsolidated	Consolidated	Nonconsolidated	Consolidated
754	6,109	208	4,810	962	10,919

Note: Amount allocated as a reserve credit is the result of a trial calculation of the full cost of remediation measures, up to completion of the contamination cleanup.

### Thorough prevention of groundwater and soil contamination

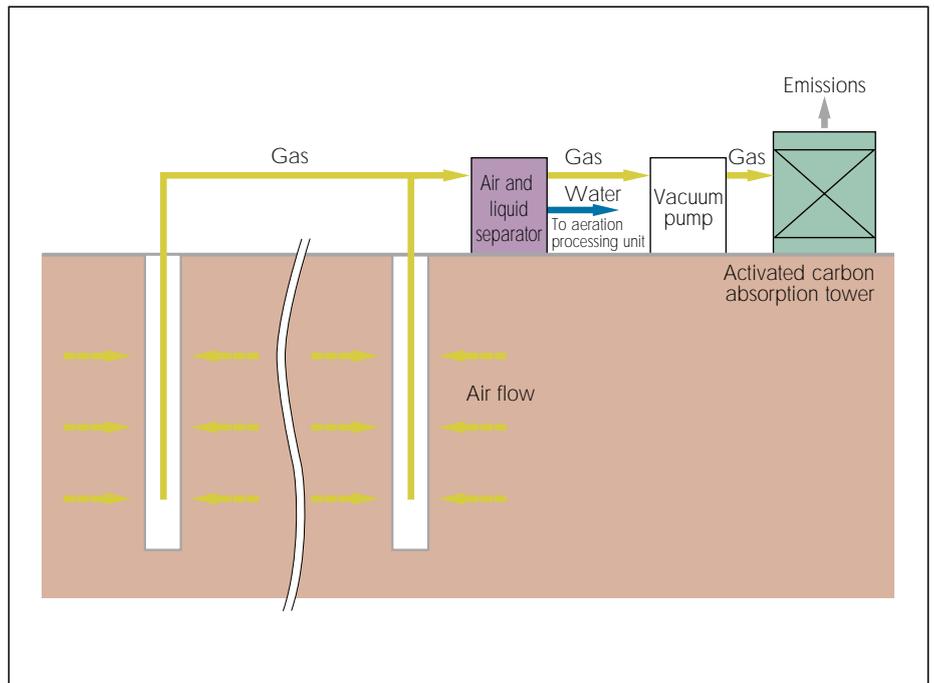
Beginning in 1995, Murata established a voluntary standard for preventing ground permeation. As a result, we are taking steps to avoid ground permeation by any and all chemical substances. To ensure compliance with our voluntary standard for ground permeation prevention, we are implementing the measures stated at right. These measures have been concluded everywhere during fiscal 2001, except in some parts of some plants. [See page 12.](#)

Tanks containing chemical substances shall be double-walled and installed above ground, fluid control banks shall be installed, and leakage control coatings shall be applied.

All forms of conveyance for chemicals, drainage from production processes and wastewater treatment equipment shall be double-walled and installed above ground.

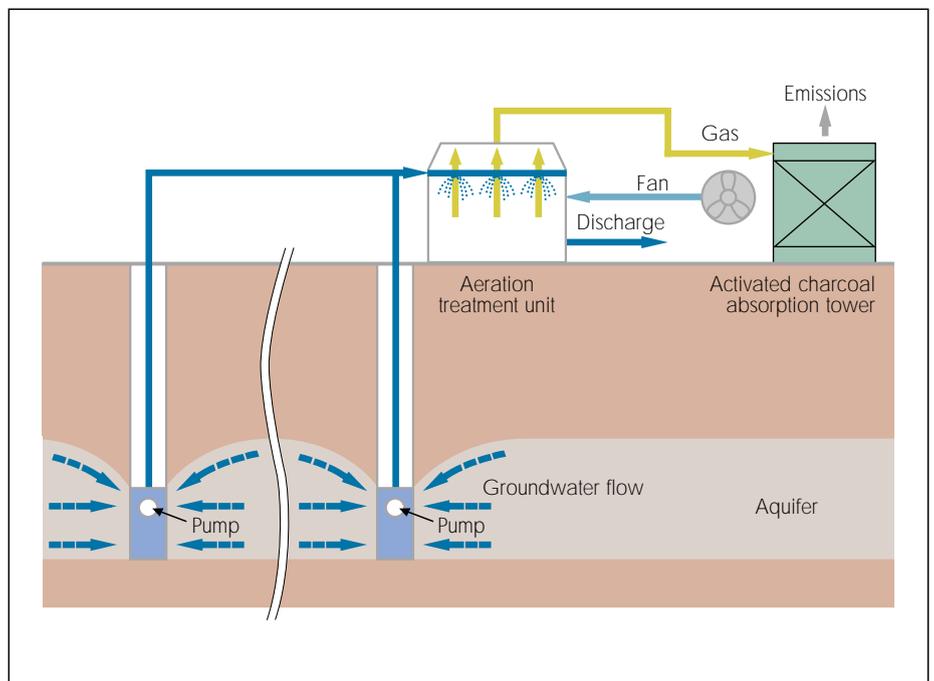
#### \*1. Strong vacuum extraction and activated carbon absorption process

A well drilled for remediation of a contaminated area is decompressed with the installation of a vacuum pump. Any chlorinated organic solvents in the soil are extracted by means of gasification. The recovered gas is processed by means of absorption with activated charcoal.



#### \*2. Water pumping, aeration and activated carbon absorption process

Groundwater is pumped up with a pump installed in a well used for remediation of a contaminated area. The recovered water is aerated and the chlorinated organic solvent is isolated by means of gasification. The treated water is discharged into the sewerage or a river when the contaminant has been reduced to less than one-half the environmental standard. The gasified chlorinated organic solvent is processed by means of absorption with activated charcoal.



## Occupational Health and Safety

Murata promotes occupational health and safety in the effort to provide a work environment in which each employee can work without risk to health and safety.

### Statistics on Work-Related Injuries and Deaths

Murata has taken steps as an entire group with the goal of preventing work-related injuries and deaths. As a result of this effort, the number of incidents to date has decreased. Moreover, the rate of occurrence of work-related injuries or deaths per million working hours ("frequency rate") is at a very low level in comparison with the domestic average for the electrical machinery and apparatus manufacturing industry. However, we will continue to work toward a goal of zero work-related injuries and deaths. To remove any potential risks associated with the occurrence of accidents, in fiscal 2000 we introduced an inspection and registration system applicable to the introduction of new chemical substances. Moreover, in fiscal 2001, we developed a risk assessment system applicable to production equipment.

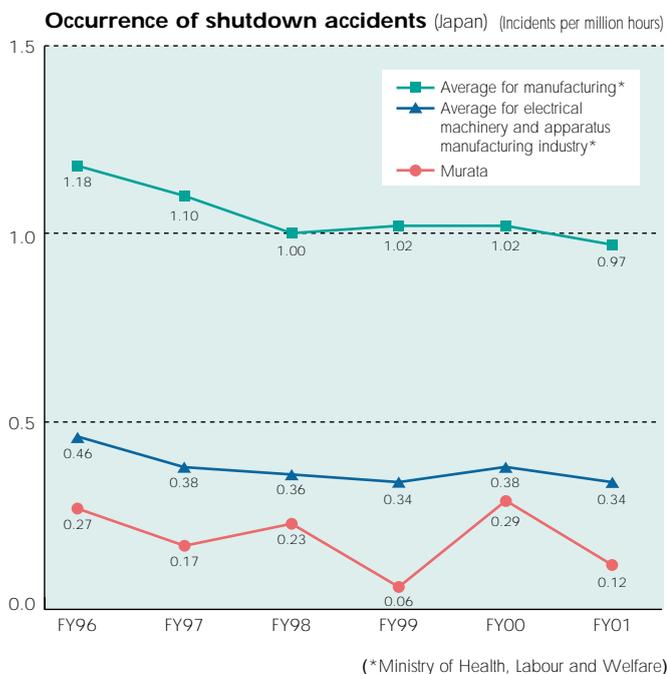
Another of our initiatives involves instituting accident prevention under a management superintendent who utilizes special skills for monitoring work, standardizes operations in non-regular work, and produces procedure manuals.

### Promoting Total Health Promotion (THP\*) Activities

Activities that contribute to the health of employees are growing in importance. Murata itself has established a basic approach to promoting health, and on this basis we have adopted activities intended to promote health maintenance. Moreover, we are supporting both the physical and mental health of our employees.

For example, we provide nutritional guidance as well as exercise guidance based on measurements of motor functions and the results of a physical examination. We also support health-promoting activities in which the individual sets and adopts his or her own goals regarding life in general such as exercise, meals and preference for an improved lifestyle. Additionally, we are actively sponsoring the information and opportunities required for the health of both the mind and body by staging exercise promotion events centered around walking as well as mental health classes.

\*Healthful activity for the mind and body advocated by the Ministry of Health, Labour and Welfare



### The Occupational Health & Safety Forum

Murata has stepped up efforts to improve the group-wide level of occupational health and safety. As part of this effort, we introduced a health and safety conference periodically in order to assemble the entire domestic group. This conference brought together the persons in charge of Occupational Health and Safety Division, the Production Technology Division, and the Manufacturing Division in order to promote the collection and sharing of information and the exchange of ideas. In 1999, we renamed this event the Occupational Health and Safety Forum with management superintendents as the participants, and all participants were urged to debate a common theme in order to further increase the level of expertise related to occupational health and safety as well as their general knowledge and awareness.

The forum suggests specific schemes and tips intended to resolve occupational health and safety problems and themes contributed by the participating plants and manufacturing subsidiaries. Our goal is to make use of the knowledge gained in various occupational health and safety activities. With the horizontal spread of expertise and strategies promoted company-wide, the forum is becoming established as an activity linked to efficiency.

### Addressing Risk Assessments

In 1999, the Ministry of Labor (currently the Ministry of Health, Labour and Welfare) provided guidelines on a management system for occupational health and safety. In response, Murata took steps to organize and introduce this system. The occupational health and safety management system reduces potential causes of accidents, and systematically improves the level of occupational health and safety through a plan to continuously promote the process chain encompassing planning, enforcement, assessment and improvement. In fiscal 2001, Murata introduced a risk assessment approach that can be considered the nucleus of this system, and we are moving ahead with preparations toward developing an occupational health and safety management system that accommodates the specified guidelines.

## Harmony with the Community

We want our presence to be a source of joy and pride in the communities in which we operate. Toward this end, we are promoting community volunteering activities, communication concerning the environment, and green landscaping of company grounds.

### Community Volunteering Activities

Each of Murata's plants and subsidiaries makes an effort to be recognized as a member of local society, and seeks to cooperate with both local residents and the government on initiatives emphasizing community environmental preservation. In this connection, Murata and some of its subsidiaries participate in a special holiday system intended to allow employees to participate in volunteer activities benefiting the community.

#### The Yasu Plant's MYU-Town Activities

The activities of MYU-Town - an abbreviation for "Murata Yasu United-Town" - are community activities intended to unite Murata and the Yasu community. Among its main activities are community environmental enhancement activities and donations of wheelchairs purchased with the proceedings from charity bazaars.



#### Initiatives of Iwami Murata

The employees of Iwami Murata Manufacturing have organized the Ginrei-kai friendship organization, which carries out a volunteer community cleanup every year.



### Communication Concerning the Environment

#### Our approach to disclosure of environmental information

Murata's environmental policy is characterized by active and timely disclosure of information, as evidenced by our announcements to the mass media, responses to journalists, and advertising.

In the area of official announcement of various scientific findings on the environment, Murata's stance is that the best policy for maintaining high credibility and objectivity is to report to the local government, which is involved in various highly specialized laws, ordinances and regulations and is entrusted to apply its own evaluation and judgment. We have long conferred with the local governments that govern the locations of our plants or subsidiaries, and we follow their guidance.

Murata will continue to maintain this stance of information disclosure; however, so that others may understand our various environmental policies, the entire Murata group will continue to issue an annual environmental report. The report will also be posted on our Web site in order to minimize the number of printed copies and thereby conserve paper resources.



#### The Hakui Murata Initiative

Every year, we participate in and support the "Chirihama Clean Campaign" sponsored by the city of Hakui, Ishikawa.



## Green Landscaping of Plants and Offices

Murata is taking steps to ensure harmony with local communities through green landscaping of plant and office sites. This effort includes restoration of virgin forests and remediation of the local natural environment.

### Protection of virgin forests

We are taking steps to develop walking trails, remove weeds and control the pine weevil. Pruned branches and shrubs are composted and used as bark fertilizer.

### Restoration of virgin forests and harmony with local communities

In the belief that rich greenery ensures harmony with the community, we are promoting the cultivation of trees and plants that allow people to enjoy the changes of the four seasons. Visitors to areas of flowering trees and arbors in prefectures and municipalities can enjoy flowers, fruits, the scents of greenery, autumn colors, wild birds and insects, as well as shrubs and 80,000 trees of 250 species growing in a virgin forest.

### Harmony with local communities

Murata cultivates many species of plants and trees and opens its green areas to the community during the blossom season, welcoming many visitors each year.

- The Yokaichi Plant and Yasu Plant cultivate 1,500 rhododendrons - the official flower of Shiga prefecture - in 150 varieties. Every year they hold a rhododendron appreciation event. Both plants welcome several thousand visitors from the local community and from outside their prefectures. This event has become established as a community event.
- Izumo Murata Manufacturing cultivates rows of cherry trees (340 trees of 59 varieties) and opens its gardens to the public when the cherry blossoms are in bloom. It also cultivates 1,000 varieties of camellia in a garden that is opened to the local community when the flowers are in season.
- Kanazawa Murata Manufacturing harvests apples from its apple orchard and donates them to welfare facilities, day care centers and other community facilities, where they are much appreciated.



Rhododendron appreciation event at the Yokaichi Plant



Cherry blossom appreciation event at Izumo Murata Manufacturing



Green Landscaping project at Kanazawa Murata Manufacturing

#### Major Green Landscaping Commendations

- 2000 Izumo Murata Manufacturing wins the Chugoku District Directors Award from the Ministry of International Trade and Industry.
- 1999 Izumo Murata Manufacturing is commended by the Japan Green Landscaping Center at the 18th National Convention for Promotion of Factory Green Landscaping.
- 1998 Yasu Murata Manufacturing is commended by the Japan Green Landscaping Center at the 17th National Convention for Promotion of Factory Green Landscaping.
- 1998 Fukui Murata Manufacturing is presented with the Chairman's Award of the 8th Promotion Council in the Hanano Machizukuri Contest.
- 1996 Yasu Murata Manufacturing is awarded the Silver Award in the Shiga Factory Green Landscaping Contest.

## Corporate Profile

### Domestic Sites

Murata Manufacturing Co., Ltd.

Head Office: Nagaoka Plant\*

Yokaichi Plant\*

Yasu Plant\*

Yokohama Technical Center\*

Tokyo Branch\*



Head Office: Nagaoka Plant\*

Fukui Murata Manufacturing Co., Ltd.\*

Izumo Murata Manufacturing Co., Ltd.\*

Kanazawa Murata Manufacturing Co., Ltd.\*

Toyama Murata Manufacturing Co., Ltd.\*

Komatsu Murata Manufacturing Co., Ltd.\*

Hakui Murata Manufacturing Co., Ltd.\*

Okayama Murata Manufacturing Co., Ltd.\*

Sabae Murata Manufacturing Co., Ltd.\*

Kanazu Murata Manufacturing Co., Ltd.\*

Himi Murata Manufacturing Co., Ltd.\*

Iwami Murata Manufacturing Co., Ltd.\*

Wakura Murata Manufacturing Co., Ltd.\*

Anamizu Electronics Industries, Ltd.\*

Asuwa Electronics Industries, Ltd.\*

Tome Murata Manufacturing Co., Ltd.\*

Azumi Murata Manufacturing Co., Ltd.\*

and six other companies

### Overseas Sites

#### < North & South America >

Murata Electronics North America, Inc. (USA)\*

Murata World Comercial Ltda. (Brazil)

Murata Amazônia Indústria E Comércio Ltda. (Brazil)\*

Murata Eletrônica Do Brasil Ltda. (Brazil)

#### < Europe >

Murata Europe Management GmbH (Germany)

Murata Elektronik GmbH (Germany)\*

Murata Elektronik Handels GmbH (Germany)

Murata Electronics (Netherlands) B.V. (Netherlands)

Murata Electronics (UK) Limited (UK)

Murata Manufacturing (UK) Limited (UK)\*

Murata Electronique S.A. (France)

Murata Electronics Switzerland AG. (Switzerland)

Murata Elettronica S.p.A. (Italy)

and one other company

#### < Asia >

Beijing Murata Electronics Co., Ltd. (China)\*

Murata Electronics Trading (Tianjin) Co., Ltd. (China)

Wuxi Murata Electronics Co., Ltd. (China)\*

Suzhou Murata Electronics Co., Ltd. (China)

Murata Electronics Trading (Shanghai) Co., Ltd. (China)

Murata Electronics Trading (Shenzhen) Co., Ltd. (China)

Murata Co., Ltd. (China)

Hong Kong Murata Electronics Co., Ltd. (China)

Korea Murata Electronics Co., Ltd. (Korea)

Taiwan Murata Electronics Co., Ltd. (Taiwan)\*

Murata Electronics Singapore (Pte.) Ltd. (Singapore)\*

Murata Electronics Philippines Inc. (The Philippines)

Murata Electronics (Thailand), Ltd. (Thailand)\*

Thai Murata Electronics Trading, Ltd. (Thailand)

Murata Electronics (Malaysia) Sdn., Bhd. (Malaysia)\*

Murata Trading (Malaysia) Sdn., Bhd. (Malaysia)

Domestic and overseas subsidiaries listed are those in existence as of April 1, 2002.

\* The environmental data listed by plant beginning on page 34 represent the environmental impacts data of Murata Manufacturing Co., Ltd. (excluding sales branches) and domestic and overseas production subsidiaries marked with an asterisk.

## Domestic and Overseas Production Bases



Murata Manufacturing Co., Ltd. Yasu Plant



Murata Manufacturing Co., Ltd. Yokaichi Plant



Fukui Murata Manufacturing Co., Ltd.



Izumo Murata Manufacturing Co., Ltd.



Kanazawa Murata Manufacturing Co., Ltd.



Toyama Murata Manufacturing Co., Ltd.



Komatsu Murata Manufacturing Co., Ltd.



Okayama Murata Manufacturing Co., Ltd.



Murata Electronics North America, Inc.



Murata Manufacturing (UK) Limited



Murata Electronics (Malaysia) Sdn. Bhd.



Murata Electronics Singapore (Pte.) Ltd.



Murata Electronics (Thailand), Ltd.



Wuxi Murata Electronics Co., Ltd.

# Environmental Data by Murata Plants

In every Murata plant, either in Japan or overseas, the management level for controlling possibly pollutants is always strict enough to meet the currently effective local laws or regulations.

- [1] The data for chemical substances in this report are in principle for those substances subjected to the laws or regulations currently effective in the country or region where the Murata plant in question is situated.
- [2] The items lacking a target level are those being subjected to voluntary control.
- [3] The water quality data are the values measured at the final discharge point.
- [4] The air quality data are the values measured at the exhaust point.
- [5] The data listed below either with plants in Japan or overseas are those acquired in the period of April 1, 2001 to March 31, 2002.
- [6] The fuel consumption values have been obtained by converting the consumptions of heavy oil, kerosene and fuel gas into the equivalent consumption of petroleum. For this purpose, the conversion coefficient for plants in Japan and overseas is the one mentioned in the regular report per Law Concerning the Rational Use of Energy in Japan.
- [7] Either with plants in Japan or overseas, "recycling ratio" refers to a ratio of waste (including salable waste) sold or recycled to the total amount released:  
[Recycling ratio=(amount sold + amount recycled) /total amount released]
- [8] Target levels are taken from the strictest values stipulated by laws, regulations and agreements with local government, with plants either in Japan or overseas.
- [9] The \*amounts released or transported of substance subjected to PRTR\* have been calculated in compliance with the PRTR law in Japan. The results have been rounded off to the order of 0.1 ton.

## Murata Manufacturing Co., Ltd. Head Office/Nagaoka Plant

26-10, Tenjin 2-chome, Nagaokakyo-shi, Kyoto 617-8555, Japan  
Electricity consumption: 7,315,668 kWh/year  
Fuel consumption: 57 kℓ/year  
Total waste released: 178 metric tons/year  
(Recycling ratio: 93.7%)

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	7.6	7.4-7.7*1
BOD	160	0.5	2.4
Lead	0.1	N.D.	N.D.
Fluorine and its compounds	15*2	0.2	0.7
Nickel	-	0.02	0.03
Dichloromethane	0.2	N.D.	N.D.
Carbon tetrachloride	0.02	N.D.	N.D.
1,2-dichloroethane	0.04	N.D.	N.D.
1,1,1-trichloroethane	3	N.D.	N.D.
1,1,2-trichloroethane	0.06	N.D.	N.D.
1,1-dichloroethylene	0.2	N.D.	N.D.
Trichloroethylene	0.3	0.002	0.006
Tetrachloroethylene	0.1	N.D.	N.D.
Benzene	0.1	N.D.	N.D.

Unit: pH, none; others, mg/ℓ

pH: hydrogen ion concentration

BOD: Biochemical Oxygen Demand

N.D.: not greater than minimum limit of detection (Not Detected)

1: The minimum to maximum pH values.

2: The target levels for fluorine and its compounds are the temporary requirements for the electronic components manufacturing industry in Japan, that were stipulated by the associated law and will remain effective to June 30, [Target level]: No particular standard value per currently effective laws or regulations.

### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.3	0.03	0.04
SOx	1	0.02	0.02
NOx	180	67	69

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm

**Amount released or transported of substances to be subjected to PRTR:**  
Any substances to be subjected to PRTR is used in an amount that necessitates registration.

## Murata Manufacturing Co., Ltd. Yokaichi Plant

4-4-1, Higashiokino, Yokaichi-shi, Shiga 527-8558, Japan  
Electricity consumption: 82,102,920 kWh/year  
Fuel consumption: 6,293 kℓ/year  
Total waste released: 2,821 metric tons/year  
(Recycling ratio: 54.1%)

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	6.0-8.5	7.5	6.9-8.0*1
COD	15	4	12
BOD	12	2.4	12
SS	20	0.1	3
n-hexane (mineral oil)	3	0.2	1.7
Phenol	1	N.D.	N.D.
Copper	1	0.015	0.023
Zinc	1	0.17	0.54
Soluble iron	10	0.4	2
Soluble manganese	10	0.07	0.17
Total chromium	0.1	N.D.	N.D.
Hexavalent chromium	0.05	N.D.	N.D.
Number of coliform groups	3000	21	110
Total nitrogen	8	2.8	5.0
Total phosphorus	0.8	0.03	0.11
Lead	0.1	0.001	0.015
Fluorine and its compounds	8	0.4	1
Boron and its compounds	2	0.1	0.3
Ammonia			
Ammonium compounds			
Nitrite compounds and nitrate compounds	730*2	2.20	3.86
Nickel	-	0.06	0.14
Antimony	0.05	N.D.	N.D.
Dichloromethane	0.2	N.D.	N.D.
Carbon tetrachloride	0.02	N.D.	N.D.
1,2-dichloroethane	0.04	N.D.	N.D.
1,1,1-trichloroethane	3.0	N.D.	N.D.
1,1,2-trichloroethane	0.06	N.D.	N.D.
1,1-dichloroethylene	0.2	N.D.	N.D.
Trichloroethylene	0.3	N.D.	0.002
Tetrachloroethylene	0.1	N.D.	N.D.
Benzene	0.1	N.D.	N.D.

Unit: pH, none; number of coliform groups, number/cc; others, mg/ℓ

pH: hydrogen ion concentration

COD: Chemical Oxygen Demand

BOD: Biochemical Oxygen Demand

N.D.: not greater than minimum limit of detection (Not Detected)

1: The minimum to maximum pH values.

2: The target levels for ammonia, ammonium compounds, nitrite compounds and nitrate compounds are the temporary requirements for the electronic components manufacturing industry in Japan, that were stipulated by the associated law and will remain effective to June 30, 2004.

[Target level]: No particular standard value per currently effective laws or regulations.

### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.1	0.01	0.09
SOx	0.63	N.D.	0.02
NOx	130	51	110
Lead	7	0.03	0.03
Lead (at border of site)	0.0015	N.D.	N.D.
Phenol (at border of site)	0.2	N.D.	N.D.
Fluorine (at border of site)	0.02	N.D.	N.D.
Cadmium (at border of site)	0.001	N.D.	N.D.
Antimony (at border of site)	0.005	N.D.	N.D.
Nickel (at border of site)	-	N.D.	N.D.
Hydrogen chloride (at border of site)	0.07	N.D.	N.D.
Chlorine (at border of site)	0.03	N.D.	N.D.
Suspended particulate matter (at border of site)	-	43	79

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm; others, mg/Nm<sup>3</sup>

N.D.: not greater than minimum limit of detection (Not Detected)

Level of pollution was measured at several locations, each location given a unique target level. For safe evaluation, the strictest level is adopted.

[Target level]: No particular standard value per currently effective laws or regulations.

### Amount released or transported of substances to be subjected to PRTR:

Chemical compound name	Amount released				Amount transferred	
	Atmosphere	Public waters	Soil	Landfill	Sewage	Waste
Xylene	0.7	0.0	0.0	0.0	0.0	15.5
Silver and its water-soluble compounds	0.0	0.0	0.0	0.0	0.0	0.2
Toluene	0.7	0.0	0.0	0.0	0.0	38.3
Lead and its compounds	0.5	0.0	0.0	0.0	0.0	2.1
Nickel compounds	0.0	0.0	0.0	0.0	0.0	4.3
Barium and its water-soluble compounds	0.2	0.0	0.0	0.0	0.0	9.7
Formaldehyde	0.6	0.0	0.0	0.0	0.0	0.0
Manganese and its compounds	0.0	0.0	0.0	0.0	0.0	1.4

Unit: metric tons/year

# Environmental Data by Murata Plants

## Murata Manufacturing Co., Ltd. Yasu Plant

2288, Oshinohara, Yasu-cho, Yasu-gun, Shiga 520-2393, Japan

Electricity consumption: 15,817,368 kWh/year

Fuel consumption: 15,034 kl/year

Total waste released: 5,855 metric tons/year

(Recycling ratio: 78.4%)

### Water quality data:

#### [Outlet #1 and #2]

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	6.0-8.5	7.5	7.1-7.7*1
SS	25	1	10
COD	20	4.9	18
BOD	20	3.2	19
n-hexane (mineral oil)	3	N.D.	N.D.
Phenol	1	N.D.	N.D.
Copper	1	0.005	0.008
Zinc	1	0.1	0.3
Soluble iron	10	0.1	0.1
Soluble manganese	10	0.03	0.04
Total chromium	0.1	N.D.	N.D.
Hexavalent chromium	N.D.	N.D.	N.D.
Number of coliform groups	3000	48	160
Total nitrogen	8	0.4	3.5
Total phosphorus	0.6	0.03	0.12
Cadmium	N.D.	N.D.	N.D.
Cyanide	N.D.	N.D.	N.D.
Lead	0.1	N.D.	N.D.
Arsenic	N.D.	N.D.	N.D.
Fluorine and its compounds	6	0.04	0.2
Boron and its compounds	2	0.03	0.14
Ammonia Ammonium compounds			
Nitrite compounds and nitrate compounds	730 *2	0.31	0.79
Nickel	-	0.002	0.007
Tin	-	N.D.	N.D.
Antimony	0.05	N.D.	N.D.
Dichloromethane	N.D.	N.D.	N.D.
Carbon tetrachloride	N.D.	N.D.	N.D.
1,2-dichloroethane	N.D.	N.D.	N.D.
1,1,1-trichloroethane	N.D.	N.D.	N.D.
1,1,2-trichloroethane	N.D.	N.D.	N.D.
1,1-dichloroethylene	N.D.	N.D.	N.D.
Cis-1,2-dichloroethylene	N.D.	N.D.	N.D.
Trichloroethylene	N.D.	N.D.	N.D.
Tetrachloroethylene	N.D.	N.D.	N.D.
1,3-dichloropropene	N.D.	N.D.	N.D.
Benzene	N.D.	N.D.	N.D.

Unit: pH, none; number of coliform groups, number/cc; others, mg/ℓ

pH: hydrogen ion concentration

COD: Chemical Oxygen Demand

BOD: Biochemical Oxygen Demand

N.D.: not greater than minimum limit of detection (Not Detected)

\*1: The minimum to maximum pH values.

\*2: The target levels for ammonia, ammonium compounds, nitrite compounds and nitrate compounds are the temporary requirements for the electronic components manufacturing industry in Japan, that were stipulated by the associated law and will remain effective to June 30, 2004.

\*[Target level-]: No particular standard value per currently effective laws or regulations.

#### [Outlet #3 and #4]

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	6.0-8.5	7.8	6.5-8.3*1
SS	25	5.5	22.0
COD	15	3.8	7.4
BOD	15	1.7	11.2
n-hexane (mineral oil)	3	N.D.	N.D.
Phenol	1	N.D.	N.D.
Copper	1	0.019	0.036
Zinc	1	0.044	0.069
Soluble iron	10	0.6	1.1
Soluble manganese	10	0.175	0.091
Total chromium	0.1	N.D.	N.D.
Hexavalent chromium	N.D.	N.D.	N.D.
Number of coliform groups	3000	210	780
Total nitrogen	8	0.6	7.4
Total phosphorus	0.5	0.10	0.46
Cadmium	N.D.	N.D.	N.D.
Cyanide	N.D.	N.D.	N.D.
Lead	0.1	N.D.	N.D.
Arsenic	N.D.	N.D.	N.D.
Fluorine and its compounds	6	0.1	0.4
Boron and its compounds	2	N.D.	0.06
Ammonia Ammonium compounds			
Nitrite compounds and nitrate compounds	730 *2	0.4	2.38
Nickel	-	0.01	0.07
Tin	-	0.05	0.09
Antimony	0.05	N.D.	N.D.
Dichloromethane	N.D.	N.D.	N.D.
Carbon tetrachloride	N.D.	N.D.	N.D.
1,2-dichloroethane	N.D.	N.D.	N.D.
1,1,1-trichloroethane	N.D.	N.D.	N.D.
1,1,2-trichloroethane	N.D.	N.D.	N.D.
1,1-dichloroethylene	N.D.	N.D.	N.D.
Cis-1,2-dichloroethylene	N.D.	N.D.	N.D.
Trichloroethylene	N.D.	N.D.	N.D.
Tetrachloroethylene	N.D.	N.D.	N.D.
1,3-dichloropropene	N.D.	N.D.	N.D.
Benzene	N.D.	N.D.	N.D.

Unit: pH, none; number of coliform groups, number/cc; others, mg/ℓ

pH: hydrogen ion concentration

COD: Chemical Oxygen Demand

BOD: Biochemical Oxygen Demand

N.D.: not greater than minimum limit of detection (Not Detected)

\*1: The minimum to maximum pH values.

\*2: The target levels for ammonia, ammonium compounds, nitrite compounds and nitrate compounds are the temporary requirements for the electronic components manufacturing industry in Japan, that were stipulated by the associated law and will remain effective to June 30, 2004.

\*[Target level-]: No particular standard value per currently effective laws or regulations.

### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.05	N.D.	N.D.
NOx	70	27	51
Lead	7	N.D.	N.D.
Fluorine compounds	3	N.D.	N.D.
Antimony	3	N.D.	N.D.
Ethyl acetate	-	N.D.	N.D.

Unit: soot and dust, g/Nm<sup>3</sup>; NOx, ethyl acetate, ppm; lead, fluorine compounds, antimony, mg/Nm<sup>3</sup>

N.D.: not greater than minimum limit of detection (Not Detected)

[Target level-]: No particular standard value per currently effective laws or regulations.

### Amount released or transported of substances to be subjected to PRTR:

Chemical compound name	Amount released				Amount transferred		
	Atmosphere	Public waters	Soil	Landfill	Sewage	Waste	Recycling
Bisphenol A type liquid-epoxy resin	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Silver and its water-soluble compounds	0.0	0.0	0.0	0.0	0.0	0.1	0.5
Toluene	0.4	0.0	0.0	0.0	0.0	3.2	0.0
Nickel	0.0	0.0	0.0	0.0	0.0	0.3	0.2
Nickel compounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tetrahydroxymethyl anhydrous phthalic acid	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Hydrazine	0.0	0.0	0.0	0.0	0.0	3.2	0.0

Unit: metric tons/year

### Murata Manufacturing Co., Ltd. Yokohama Technical Center

18-1, Hakusan 1-chome, Midori-ku Yokohama-shi, Kanagawa 226-0006, Japan  
 Electricity consumption: 3,927,774 kWh/year  
 Fuel consumption: 643 kℓ/year  
 Total waste released: 55 metric tons/year  
 (Recycling ratio: 26.3%)

#### Water quality data:

The management level is strictly enough to meet the target level.  
**Process wastewater**

Item	Target level	Average	Max. value
pH	5.0-9.0	7.5	7.2-7.9*1
SS	-	0.9	4
COD	-	2.6	2.9
BOD	-	0.3	0.6
n-hexane (mineral oil)	5	N.D.	N.D.
Copper	1	0.006	0.012
Zinc	1	0.02	0.04
Soluble iron	3	1.5	2.5
Soluble manganese	1	0.006	0.008
Lead	0.1	N.D.	N.D.
Arsenic	0.1	N.D.	N.D.
Fluorine and its compounds	15*2	0.1	0.2
Boron and its compounds	25*2	N.D.	0.02
Nickel	-	N.D.	N.D.
Tin	-	N.D.	N.D.
Barium	-	0.002	0.013
Palladium	-	N.D.	N.D.
Strontium	-	0.02	0.03
Zirconium	-	N.D.	N.D.
Antimony	-	N.D.	N.D.
Dichloromethane	0.2	N.D.	N.D.
Carbon tetrachloride	0.02	N.D.	N.D.
1,2-dichloroethane	0.04	N.D.	N.D.
1,1,1-trichloroethane	3	N.D.	N.D.
1,1,2-trichloroethane	0.06	N.D.	N.D.
1,1,1-dichloroethylene	0.2	N.D.	N.D.
Trichloroethylene	0.3	N.D.	N.D.
Tetrachloroethylene	0.1	N.D.	N.D.
Benzene	0.1	N.D.	N.D.

#### Domestic wastewater

Item	Target level	Average	Max. value
pH	5.0-9.0	6.7	5.4-7.7*1
SS	-	68	110
COD	-	87	89
BOD	-	200	200
n-hexane (mineral oil)	-	25	92

Unit: pH, none; others, mg/ℓ  
 pH: hydrogen ion concentration  
 COD: Chemical Oxygen Demand  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 \*1: The minimum to maximum pH values.  
 \*2: The target levels for fluorine, fluorine compounds, boron, boron compounds are the temporary requirements for the electronic components manufacturing industry in Japan, that were stipulated by the associated law and will remain effective to June 30, 2004.  
 \*[Target level]: No particular standard value per currently effective laws or regulations.

#### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
NOx B-1 boiler	0.130	0.034	0.034
NOx B-2 boiler	0.055	0.027	0.027
NOx chilled/hot water generator	0.046	0.030	0.042
NOx gas engine	0.111	0.051	0.081

Unit: NOx, Nm<sup>3</sup>/h

Amount released or transported of substances to be subjected to PRTR:  
 Any substances to be subjected to PRTR is used in an amount that necessitates registration.

### Murata Manufacturing Co., Ltd. Tokyo Branch

29-12, Shibuya 3-chome, Shibuya-ku, Tokyo 150-0002, Japan  
 Electricity consumption: 961,512 kWh/year  
 Fuel consumption: 68 kℓ/year  
 Total waste released: 38 metric tons/year  
 (Recycling ratio: 84.1%)

#### Water quality data:

No facility or equipment subjected to a relevant law or regulation is present, and no measurement is performed for this purpose.

#### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.05	0.007	0.009
NOx	60	23	26

Unit: soot and dust, g/Nm<sup>3</sup>; NOx, ppm

Amount released or transported of substances to be subjected to PRTR:  
 Any substances to be subjected to PRTR is used in an amount that necessitates registration.

### Fukui Murata Manufacturing Co., Ltd.

1,13-go, Okamoto-cho, Takefu-shi, Fukui 915-8601, Japan  
 Electricity consumption: 124,452,000 kWh/year  
 Fuel consumption: 8,832 kℓ/year  
 Total waste released: 4,751 metric tons/year  
 (Recycling ratio: 52.6%)

#### 【Takefu Plant】

#### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	7.3	6.4-8.0*1
SS	45	3.4	24
BOD	30	2.9	18
n-hexane (mineral oil)	5	0.1	0.7
Phenol	5	N.D.	N.D.
Copper	3	0.01	0.03
Zinc	5	0.023	0.035
Soluble iron	10	1.6	4.9
Soluble manganese	10	0.8	2.2
Total chromium	2	N.D.	N.D.
Hexavalent chromium	0.05	N.D.	N.D.
Cadmium	0.1	N.D.	N.D.
Cyanide	1	N.D.	N.D.
Lead	0.1	N.D.	N.D.
Mercury	0.005	N.D.	N.D.
Arsenic	0.1	0.001	0.004
Fluorine and its compounds	15	N.D.	N.D.
Boron and its compounds	10	0.04	0.09
Ammonia			
Ammonium compounds			
Nitrite compounds and nitrate compounds	730*2	1.5	3.7
Nickel	5	0.003	0.017
Tin	5	N.D.	0.03
Dichloromethane	0.2	N.D.	N.D.
Carbon tetrachloride	0.02	N.D.	N.D.
1,2-dichloroethane	0.04	N.D.	N.D.
1,1,1-trichloroethane	3	N.D.	N.D.
1,1,2-trichloroethane	0.06	N.D.	N.D.
1,1-dichloroethylene	0.2	N.D.	N.D.
Cis-1,2-dichloroethylene	0.4	N.D.	N.D.
Trichloroethylene	0.3	N.D.	N.D.
Tetrachloroethylene	0.1	N.D.	N.D.
1,3-dichloropropene	0.02	N.D.	N.D.
Benzene	0.1	N.D.	N.D.

Unit: pH, none; others, mg/ℓ  
 pH: hydrogen ion concentration  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 \*1: The minimum to maximum pH values.  
 \*2: The target levels for ammonia, ammonium compounds, nitrite compounds and nitrate compounds are the temporary requirements for the electronic components manufacturing industry in Japan, that were stipulated by the associated law and will remain effective to June 30, 2004.

#### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.1	N.D.	N.D.
NOx	150	55	86

Unit: soot and dust, g/Nm<sup>3</sup>; NOx, ppm  
 N.D.: not greater than minimum limit of detection (Not Detected)

#### Amount released or transported of substances to be subjected to PRTR:

Chemical compound name	Amount released				Amount transferred		
	Atmosphere	Public waters	Soil	Landfill	Sewage	Waste	Recycling
Silver and its watersoluble compounds	0.0	0.0	0.0	0.0	0.0	0.1	0.8
Toluene	3.2	0.0	0.0	0.0	0.0	0.2	0.0
Lead and its compounds	0.0	0.0	0.0	0.0	0.0	12.6	0.0
Nickel	0.0	0.0	0.0	0.0	0.0	9.8	0.0
Nickel compounds	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Barium and its watersoluble compounds	0.0	0.0	0.0	0.0	0.0	49.8	0.0
Bis-2-ethylhexyl phthalate	0.0	0.0	0.0	0.0	0.0	4.4	0.0

Unit: metric tons/year

# Environmental Data by Murata Plants

## Izumo Murata Manufacturing Co., Ltd.

2308, Kaminaoe, Hikawa-cho, Hikawa-gun, Shimane 699-0696, Japan  
 Electricity consumption: 122,844,798 kWh/year  
 Fuel consumption: 4,259 kℓ/year  
 Total waste released: 7,364 metric tons/year  
 (Recycling ratio: 23.8%)

### 【Miyazaki Plant】

#### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	7.0	6.5-7.4*1
SS	45	3.2	13
BOD	30	3	9
n-hexane (mineral oil)	5	N.D.	N.D.
Phenol	5	N.D.	N.D.
Copper	3	0.011	0.059
Zinc	5	0.07	0.12
Soluble iron	3	0.3	0.4
Soluble manganese	10	0.034	0.045
Total chromium	2	N.D.	N.D.
Hexavalent chromium	0.05	N.D.	N.D.
Cadmium	0.1	N.D.	N.D.
Cyanide	1	N.D.	N.D.
Lead	0.1	N.D.	N.D.
Mercury	0.005	N.D.	N.D.
Arsenic	0.1	N.D.	N.D.
Fluorine and its compounds	15	N.D.	N.D.
Boron and its compounds	10	N.D.	N.D.
Ammonia			
Ammonium compounds	730*2	0.7	1.2
Nitrite compounds and nitrate compounds			
Nickel	5	0.021	0.089
Tin	5	N.D.	N.D.
Dichloromethane	0.2	N.D.	N.D.
Carbon tetrachloride	0.02	N.D.	N.D.
1,2-dichloroethane	0.04	N.D.	N.D.
1,1,1-trichloroethane	3	N.D.	N.D.
1,1,1,2-trichloroethane	0.06	N.D.	N.D.
1,1-dichloroethylene	0.2	N.D.	N.D.
Cis-1,2-dichloroethylene	0.4	N.D.	N.D.
Trichloroethylene	0.3	N.D.	N.D.
Tetrachloroethylene	0.1	N.D.	N.D.
1,3-dichloropropene	0.02	N.D.	N.D.
Benzene	0.1	N.D.	N.D.

Unit: pH, none; others, mg/ℓ

pH: hydrogen ion concentration

BOD: Biochemical Oxygen Demand

N.D.: not greater than minimum limit of detection (Not Detected)

\*1: The minimum to maximum pH values.

\*2: The target levels for ammonia, ammonium compounds, nitrite compounds and nitrate compounds are the temporary requirements for the electronic components manufacturing industry in Japan, that were stipulated by the associated law and will remain effective to June 30, 2004.

#### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.1	N.D.	N.D.
NOx	150	68	80

Unit: soot and dust, g/Nm<sup>3</sup>; NOx, ppm

N.D.: not greater than minimum limit of detection (Not Detected)

Amount released or transported of substances to be subjected to PRTR:  
 Any substances to be subjected to PRTR is used in an amount that necessitates registration.

### 【Shirayama Plant】

#### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	7.4	6.9-7.7*1
SS	45	1	9
BOD	30	4	8
n-hexane (mineral oil)	5	0.1	1.1
Phenol	5	N.D.	N.D.
Copper	3	0.013	0.013
Zinc	5	0.006	0.006
Soluble iron	3	0.4	0.4
Soluble manganese	10	0.01	0.01
Total chromium	2	N.D.	N.D.
Hexavalent chromium	0.05	N.D.	N.D.
Cadmium	0.1	N.D.	N.D.
Cyanide	1	N.D.	N.D.
Lead	0.1	N.D.	N.D.
Mercury	0.005	N.D.	N.D.
Arsenic	0.1	N.D.	N.D.
Fluorine and its compounds	15	N.D.	N.D.
Boron and its compounds	10	0.08	0.08
Ammonia			
Ammonium compounds	730*2	1.8	1.8
Nitrite compounds and nitrate compounds			
Nickel	5	0.009	0.017
Tin	5	N.D.	N.D.
Dichloromethane	0.2	N.D.	N.D.
Carbon tetrachloride	0.02	N.D.	N.D.
1,2-dichloroethane	0.04	N.D.	N.D.
1,1,1-trichloroethane	3	N.D.	N.D.
1,1,1,2-trichloroethane	0.06	N.D.	N.D.
1,1-dichloroethylene	0.2	N.D.	N.D.
Cis-1,2-dichloroethylene	0.4	N.D.	N.D.
Trichloroethylene	0.3	N.D.	0.004
Tetrachloroethylene	0.1	N.D.	N.D.
1,3-dichloropropene	0.02	N.D.	N.D.
Benzene	0.1	N.D.	N.D.

Unit: pH, none; others, mg/ℓ

pH: hydrogen ion concentration

BOD: Biochemical Oxygen Demand

N.D.: not greater than minimum limit of detection (Not Detected)

\*1: The minimum to maximum pH values.

\*2: The target levels for ammonia, ammonium compounds, nitrite compounds and nitrate compounds are the temporary requirements for the electronic components manufacturing industry in Japan, that were stipulated by the associated law and will remain effective to June 30, 2004.

#### Air quality data:

No facility or equipment subjected to a relevant law or regulation is present, and no measurement is performed for this purpose

Amount released or transported of substances to be subjected to PRTR:  
 Any substances to be subjected to PRTR is used in an amount that necessitates registration.

#### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	6.0-8.5	7.3	7.0-7.5*1
SS	70	3.3	7
COD	20	3	4
COD (total pollutant load control)	114.4	11.5	14.3
BOD	20	1	3
n-hexane (mineral oil)	5	N.D.	N.D.
Copper	3	0.006	0.018
Number of coliform groups	3000	N.D.	N.D.
Total nitrogen	15	2.8	3.9
Total nitrogen (total pollutant load control)	84.3	10.3	16.7
Total phosphorus	3	0.37	0.99
Total phosphorus (total pollutant load control)	16.9	1.43	4.65
Cadmium	0.1	N.D.	N.D.
Cyanide	0.8	N.D.	N.D.
Lead	0.1	N.D.	0.04
Fluorine and its compounds	15*2	N.D.	0.2
Boron and its compounds	25*2	0.02	0.08
Ammonia			
Ammonium compounds	730*2	1.8	3.7
Nitrite compounds and nitrate compounds			
Nickel	8	0.032	0.059
Tin	8	N.D.	N.D.
Dichloromethane	0.2	N.D.	N.D.
Carbon tetrachloride	0.02	N.D.	N.D.
1,2-dichloroethane	0.04	N.D.	N.D.
1,1,1-trichloroethane	3	N.D.	N.D.
1,1,1,2-trichloroethane	0.06	N.D.	N.D.
1,1-dichloroethylene	0.2	N.D.	N.D.
Trichloroethylene	0.3	N.D.	N.D.
Tetrachloroethylene	0.1	N.D.	N.D.
Benzene	0.1	N.D.	N.D.

Unit: pH, none; number of coliform groups, number/cc

Total pollutant load control about COD, total nitrogen and total phosphorus: kg/day; others, mg/ℓ

pH: hydrogen ion concentration

COD: Chemical Oxygen Demand

BOD: Biochemical Oxygen Demand

N.D.: not greater than minimum limit of detection (Not Detected)

\*1: The minimum to maximum pH values.

\*2: The target levels for fluorine, fluorine compounds, boron, boron compounds, ammonia, and ammonium compounds, nitrite compounds and nitrate compounds are the temporary requirements for the electronic components manufacturing industry in Japan, that were stipulated by the associated law and will remain effective to June 30, 2004.

#### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.1	N.D.	N.D.
SOx	10	N.D.	N.D.
NOx	150	55	96

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm

N.D.: not greater than minimum limit of detection (Not Detected)

#### Amount released or transported of substances to be subjected to PRTR:

Chemical compound name	Amount released				Amount transferred		
	Atmosphere	Surface water	Soil	Landfill	Sewage	Waste	Recycling
Toluene	5.9	0.0	0.0	0.0	0.0	138.4	358.9
Lead and its compounds	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Nickel	0.0	0.0	0.0	0.0	0.0	2.2	0.0
Nickel compounds	0.0	0.0	0.0	0.0	0.0	1.5	0.1
Barium and its water-soluble compounds	0.0	0.0	0.0	0.0	0.0	231.2	50.0
Di-n-butyl phthalate	0.0	0.0	0.0	0.0	0.0	1.3	0.0
Bis-2-ethylhexyl phthalate	0.0	0.0	0.0	0.0	0.0	5.5	0.0

Unit: metric tons/year

## Kanazawa Murata Manufacturing Co., Ltd.

Chi-18, Sodanimachi, Tsurugi-machi, Ishikawagun, Ishikawa 920-2101, Japan  
 Electricity consumption: 44,898,322 kWh/year  
 Fuel consumption: 3,302 kℓ/year  
 Total waste released: 785 metric tons/year  
 (Recycling ratio: 81.7%)

### 【Kanazawa Plant】

#### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	6.0-8.5	7.7	7.4-7.8*1
SS	70	1	6
BOD	20	4	11
n-hexane (mineral oil)	5	N.D.	N.D.
Phenol	5	N.D.	N.D.
Copper	3	N.D.	0.04
Zinc	5	0.1	1.0
Soluble iron	10	0.01	0.08
Soluble manganese	10	0.01	0.07
Total chromium	1.6	N.D.	N.D.
Hexavalent chromium	0.5	N.D.	N.D.
Number of coliform groups	3000	N.D.	2
Cadmium	0.1	N.D.	N.D.
Cyanide	0.8	N.D.	N.D.
Lead	0.1	N.D.	N.D.
Arsenic	0.1	N.D.	N.D.
Mercury	0.005	N.D.	N.D.
Fluorine and its compounds	12	0.1	0.5
Boron and its compounds	25*2	0.2	0.3
Ammonia			
Ammonium compounds	730*2	2.6	3.8
Nitrite compounds and nitrate compounds			
Nickel	-	0.04	0.12
Antimony	-	0.004	0.009
Dichloromethane	0.2	N.D.	N.D.
1,1,1-trichloroethane	3	N.D.	N.D.
Trichloroethylene	0.3	N.D.	N.D.
Tetrachloroethylene	0.1	N.D.	N.D.
Benzene	0.1	N.D.	N.D.

Unit: pH, none; number of coliform groups, number/cc; others, mg/ℓ  
 pH: hydrogen ion concentration  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 \*1: The minimum to maximum pH values.  
 \*2: The target levels for boron, boron compounds, ammonia, ammonium compounds, nitrite compounds, and nitrate compounds are the temporary requirements for the electronic components manufacturing industry in Japan, that were stipulated by the associated law and will remain effective to June 30, 2004.  
 [Target level]: No particular standard value per currently effective laws or regulations.

#### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.10	N.D.	0.004
SOx	6.05	N.D.	N.D.
NOx	150	53	110
Hydrogen chloride	60	0.04	0.08
Fluorine compounds	10	N.D.	N.D.

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm;  
 hydrogen chloride, fluorine compounds, mg/Nm<sup>3</sup>  
 N.D.: not greater than minimum limit of detection (Not Detected)

Amount released or transported of substances to be subjected to PRTR:  
 Any substances to be subjected to PRTR is used in an amount that necessitates registration.

## Toyama Murata Manufacturing Co., Ltd.

345, Ueno, Toyama-shi, Toyama 939-8195, Japan  
 Electricity consumption: 36,812,340 kWh/year  
 Fuel consumption: 128 kℓ/year  
 Total waste released: 645 metric tons/year  
 (Recycling ratio: 67.3%)

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	6.0-8.3	7.6	7.5-7.7*1
SS	50	N.D.	3
BOD	20	1.4	4.7
n-hexane (mineral oil)	3	N.D.	N.D.
Copper	3	0.023	0.042
Number of coliform groups	3000	6	18
Lead	0.1	N.D.	0.06
Fluorine and its compounds	15*2	N.D.	N.D.
Boron and its compounds	25*2	0.02	0.02
Ammonia			
Ammonium compounds			
Nitrile compounds and nitrate compounds	730*2	1.5	1.5
Nickel	-	N.D.	0.007
Tin	-	N.D.	N.D.
1,1,1-trichloroethane	1	N.D.	N.D.
Trichloroethylene	0.1	N.D.	N.D.

Unit: pH, none; number of coliform groups, number/cc; others, mg/ℓ  
 pH: hydrogen ion concentration  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 \*1: The minimum to maximum pH values.  
 \*2: The target levels for fluorine, fluorine compounds, boron, boron compounds, ammonia, and ammonium compounds, nitrile compounds and nitrate compounds are the temporary requirements for the electronic components manufacturing industry in Japan, that were stipulated by the associated law and will remain effective to June 30, 2004.  
 [Target level]: No particular standard value per currently effective laws or regulations.

#### Air quality data:

No facility or equipment subjected to a relevant law or regulation is present, and no measurement is performed for this purpose

#### Amount released or transported of substances to be subjected to PRTR:

Chemical compound name	Amount released				Amount transferred		
	Atmosphere	Public waters	Soil	Landfill	Sewage	Waste	Recycling
Toluene	4.0	0.0	0.0	0.0	0.0	15.9	0.0
Lead and its compounds	0.0	0.0	0.0	0.0	0.0	2.5	37.4

Unit: metric tons/year

# Environmental Data by Murata Plants

## Komatsu Murata Manufacturing Co., Ltd.

93, Hikari-machi, Komatsu-shi, Ishikawa 923-8626, Japan  
 Electricity consumption: 17,314,698 kWh/year  
 Fuel consumption: 293 kℓ/year  
 Total waste released: 339 metric tons/year  
 (Recycling ratio: 86.4%)

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	7.6	7.3-7.8*1
SS	70	4.3	14
COD	30	3.5	5.8
BOD	30	1.3	4.1
Copper	3	0.116	0.34
Zinc	5	0.09	0.17
Soluble iron	10	0.029	0.058
n-hexane (mineral oil)	5	N.D.	N.D.
Total chromium	2	N.D.	N.D.
Hexavalent chromium	0.5	N.D.	N.D.
Number of coliform groups	3000	110	220
Cadmium	0.1	N.D.	N.D.
Lead	0.1	0.010	0.031
1,1,1-trichloroethane	0.3	N.D.	N.D.
Trichloroethylene	3	N.D.	N.D.
Benzene	0.1	N.D.	N.D.

Unit: pH, none; number of coliform groups, number/cc; others, mg/ℓ  
 pH: hydrogen ion concentration  
 COD: Chemical Oxygen Demand  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 \*1: The minimum to maximum pH values.

### Air quality data:

No particular standard value per currently effective laws or regulations.  
 Despite this, monitoring is performed according to a voluntary control standard.

Item	Target level	Average	Max. value
Soot and dust	-	N.D.	N.D.
SOx	-	0.06	0.11
NOx	-	61	73

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 [Target level]: No particular standard value per currently effective laws or regulations.

Amount released or transported of substances to be subjected to PRTR:  
 Any substances to be subjected to PRTR is used in an amount that necessitates registration.

## Hakui Murata Manufacturing Co., Ltd.

52, Yanagibashi, Yanagibashi-machi, Hakuishi, Ishikawa 925-8555, Japan  
 Electricity consumption: 8,699,592 kWh/year  
 Fuel consumption: 180 kℓ/year  
 Total waste released: 389 metric tons/year  
 (Recycling ratio: 91.3%)

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	7.9	7.7-8.1*1
SS	40	5.2	14
COD	90	5.1	6.5
BOD	40	3.2	13.0
n-hexane (mineral oil)	5	N.D.	N.D.
Copper	3	0.006	0.013
Soluble iron	10	1.9	4.5
Total chromium	2	N.D.	N.D.
Number of coliform groups	3000	12	41
Lead	0.1	0.03	0.06
1,1,1-trichloroethane	3	N.D.	N.D.
Trichloroethylene	0.3	0.001	0.003
Tetrachloroethylene	0.1	N.D.	0.001

Unit: pH, none; number of coliform groups, number/cc; others, mg/ℓ  
 pH: hydrogen ion concentration  
 COD: Chemical Oxygen Demand  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 \*1: The minimum to maximum pH values.

### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.3	0.04	0.04
SOx	4.85	0.21	0.21
NOx	180	84	84

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm

### Amount released or transported of substances to be subjected to PRTR:

Chemical compound name	Amount released				Amount transferred		
	Atmosphere	Public waters	Soil	Landfill	Sewage	Waste	Recycling
Toluene	0.9	0.0	0.0	0.0	0.0	2.8	0.0
Lead and its compounds	0.0	0.0	0.0	0.0	0.0	0.0	27.5

Unit: metric tons/year

## 【Togi Plant】

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	8.1	7.7-8.4*1
SS	60	13	15
COD	90	10	13
BOD	60	8	12
n-hexane (mineral oil)	5	0.7	0.8
Number of coliform groups	3000	710	1200
1,1,1-trichloroethane	3	N.D.	N.D.
Trichloroethylene	0.3	N.D.	N.D.

Unit: pH, none; number of coliform groups, number/cc; others, mg/ℓ  
 pH: hydrogen ion concentration  
 COD: Chemical Oxygen Demand  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 \*1: The minimum to maximum pH values.

### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.3	N.D.	N.D.
SOx	6.1	0.2	0.2
NOx	180	92	95

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm  
 N.D.: not greater than minimum limit of detection (Not Detected)

Amount released or transported of substances to be subjected to PRTR:  
 Any substances to be subjected to PRTR is used in an amount that necessitates registration.

### Okayama Murata Manufacturing Co., Ltd.

77, Fukumoto, Oku-cho, Oku-gun, Okayama 701-4241, Japan  
 Electricity consumption: 28,463,304 kWh/year  
 Fuel consumption: 2,942 kℓ/year  
 Total waste released: 728 metric tons/year  
 (Recycling ratio: 33.3%)

#### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	6.0-8.5	7.7	7.38.0*1
SS	30	N.D.	N.D.
COD	10	2.9	4.5
BOD	10	0.7	1.3
n-hexane (mineral oil)	2	0.1	0.8
Total chromium	2	0.001	0.015
Hexavalent chromium	0.05	N.D.	N.D.
Total nitrogen	60	4.0	7.1
Total phosphorus	8	0.29	0.67
Lead	0.1	0.01	0.05
Ammonia			
Ammonium compounds	730*2	4.7	6.6
Nitrite compounds and nitrate compounds			
Dichloromethane	0.2	N.D.	N.D.
Carbon tetrachloride	0.02	N.D.	N.D.
1,2-dichloroethane	0.04	N.D.	N.D.
1,1,1-trichloroethane	3	N.D.	N.D.
1,1,2-trichloroethane	0.06	N.D.	N.D.
1,1-dichloroethylene	0.2	N.D.	N.D.
Trichloroethylene	0.3	N.D.	N.D.
Tetrachloroethylene	0.1	N.D.	N.D.
Benzene	0.1	N.D.	N.D.

Unit: pH, none; others, mg/ℓ  
 pH: hydrogen ion concentration  
 COD: Chemical Oxygen Demand  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 \*1: The minimum to maximum pH values.  
 \*2: The target levels for ammonia, ammonium compounds, nitrite compounds and nitrate compounds are the temporary requirements for the electronic components manufacturing industry in Japan, that were stipulated by the associated law and will remain effective to June 30, 2004.

#### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.05	0.001	0.001
SOx*1	4.44	0.023	0.023
NOx	100	32	39

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm  
 \*1: Level of pollution was measured at several locations, each location given a unique target level. For safe evaluation, the strictest level is adopted.

#### Amount released or transported of substances to be subjected to PRTR:

Chemical compound name	Amount released				Amount transferred		
	Atmosphere	Public waters	Soil	Landfill	Sewage	Waste	Recycling
Toluene	0.2	0.0	0.0	0.0	0.0	0.0	26.3
Lead and its compounds	0.0	0.0	0.0	0.0	0.0	2.1	0.0
Nickel compounds	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Barium and its compounds	0.0	0.0	0.0	0.0	0.0	3.7	0.0

\*Unit: metric tons/year

### Sabae Murata Manufacturing Co., Ltd.

2-82, 1-chome, Miyuki-cho, Sabae-shi, Fukui 916-0015, Japan  
 Electricity consumption: 10,650,684 kWh/year  
 Fuel consumption: 393 kℓ/year  
 Total waste released: 715 metric tons/year  
 (Recycling ratio: 71.4%)

#### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.7-8.7	7.1	5.8-7.5*1
SS	300	7.8	15
BOD	300	14	25
n-hexane (mineral oil)	5	0.4	1.5
Copper	3	0.30	0.92
Zinc	5	0.021	0.037
Soluble iron	10	0.04	0.13
Soluble manganese	10	N.D.	0.003
Total chromium	2	N.D.	N.D.
Hexavalent chromium	0.5	N.D.	N.D.
Cadmium	0.1	N.D.	0.0013
Cyanide	1	N.D.	N.D.
Lead	0.1	0.02	0.09
Mercury	0.005	N.D.	N.D.
Iodine	220	N.D.	0.5
Fluorine and its compounds	8	1.1	3.5
Nickel	5	0.2	0.5
Dichloromethane	0.2	N.D.	N.D.
Carbon tetrachloride	0.02	N.D.	N.D.
1,2-dichloroethane	0.04	N.D.	N.D.
1,1,1-trichloroethane	3	N.D.	N.D.
1,1,2-trichloroethane	0.05	N.D.	N.D.
1,1-dichloroethylene	0.2	N.D.	N.D.
Trichloroethylene	0.3	N.D.	N.D.
Tetrachloroethylene	0.1	N.D.	N.D.
Benzene	0.1	N.D.	N.D.

Unit: pH, none; others, mg/ℓ  
 pH: hydrogen ion concentration  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 \*1: The minimum to maximum pH values.

#### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.3	0.01	0.01
SOx	2.1	0.09	0.14
NOx	260	76	98

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm

#### Amount released or transported of substances to be subjected to PRTR:

Chemical compound name	Amount released				Amount transferred		
	Atmosphere	Public waters	Soil	Landfill	Sewage	Waste	Recycling
Nickel compounds	0.0	0.0	0.0	0.0	0.0	0.5	0.0

\*Unit: metric tons/year

### Kanazu Murata Manufacturing Co., Ltd.

10-28, Hananomori 2-chome, Kanazu-cho, Sakai-gun, Fukui 919-0633, Japan  
 Electricity consumption: 9,718,116 kWh/year  
 Fuel consumption: 54 kℓ/year  
 Total waste released: 363 metric tons/year  
 (Recycling ratio: 70.8%)

#### 【Kanazu Plant】

#### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	7.7	7.0-8.1*1
SS	120	0.5	4.0
COD	160	1.8	3.2
BOD	120	0.7	2.1
n-hexane (mineral oil)	5	N.D.	N.D.
Total chromium	2	N.D.	N.D.
Lead	0.1	N.D.	N.D.
Dichloromethane	0.2	N.D.	N.D.
Carbon tetrachloride	0.02	N.D.	N.D.
1,2-dichloroethane	0.04	N.D.	N.D.
1,1,1-trichloroethane	3	N.D.	N.D.
1,1,2-trichloroethane	0.06	N.D.	N.D.
1,1-dichloroethylene	0.2	N.D.	N.D.
Trichloroethylene	0.3	N.D.	N.D.
Tetrachloroethylene	0.1	N.D.	N.D.
Benzene	0.1	N.D.	N.D.

Unit: pH, none; others, mg/ℓ  
 pH: hydrogen ion concentration  
 COD: Chemical Oxygen Demand  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 \*1: The minimum to maximum pH values.

#### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.3	N.D.	N.D.
SOx	4.3	0.064	0.081
NOx	260	79	82

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm  
 N.D.: not greater than minimum limit of detection (Not Detected)

Amount released or transported of substances to be subjected to PRTR:  
 Any substances to be subjected to PRTR is used in an amount that necessitates registration.

#### 【Natsume Plant】

#### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	7.8	7.5-8.1*1
SS	200	3.3	6.0
COD	160	1.8	2.4
BOD	160	N.D.	N.D.
n-hexane (mineral oil)	5	N.D.	N.D.
Cadmium	0.1	N.D.	N.D.

Unit: pH, none; others, mg/ℓ  
 pH: hydrogen ion concentration  
 COD: Chemical Oxygen Demand  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 \*1: The minimum to maximum pH values.

#### Air quality data:

No facility or equipment subjected to a relevant law or regulation is present, and no measurement is performed for this purpose

Amount released or transported of substances to be subjected to PRTR:  
 Any substances to be subjected to PRTR is used in an amount that necessitates registration.

# Environmental Data by Murata Plants

## Himi Murata Manufacturing Co., Ltd.

12-5, Oura, Himi-shi, Toyama 935-0103, Japan  
 Electricity consumption: 7,597,188 kWh/year  
 Fuel consumption: 53 *kℓ*/year  
 Total waste released: 339 metric tons/year  
 (Recycling ratio: 60.1%)

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	6.8	6.5-7.1*1
SS	120	1	3
BOD	25	3.5	5.8
n-hexane (mineral oil)	5	0.4	1.3
Copper	1	0.03	0.04
Total chromium	2	N.D.	N.D.
Hexavalent chromium	0.5	N.D.	N.D.
Number of coliform groups	3000	N.D.	N.D.
Cadmium	0.1	N.D.	N.D.
Lead	0.1	N.D.	N.D.
1,1,1-trichloroethane	3	N.D.	N.D.
Trichloroethylene	0.3	N.D.	N.D.

Unit: pH, none; number of coliform groups, number/cc; others, mg/ℓ  
 pH: hydrogen ion concentration  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 \*1: The minimum to maximum pH values.

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	-	0.012	0.012
SOx	13.7	0.017	0.017
NOx	-	76	77

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm  
 [Target level]: No particular standard value per currently

### Amount released or transported of substances to be subjected to PRTR:

Chemical compound name	Amount released				Amount transferred		
	Atmosphere	Public waters	Soil	Landfill	Sewage	Waste	Recycling
Bisphenol A type liquid-epoxy resin	0.8	0.0	0.0	0.0	0.0	0.2	0.0
Toluene	5.3	0.0	0.0	0.0	0.0	21.1	0.0
Lead and its compounds	0.0	0.0	0.0	0.0	0.0	0.0	11.4

Unit: metric tons/year

## Iwami Murata Manufacturing Co., Ltd.

Ohda Yi 795-1, Ohda-cho, Ohdashi, Shimane 694-0064, Japan  
 Electricity consumption: 6,484,002 kWh/year  
 Fuel consumption: 210 *kℓ*/year  
 Total waste released: 261 metric tons/year

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	7.9	7.8-8.1*1
SS	200	2.7	5.0
COD	160	7.8	9.9
BOD	160	3.6	5.8
n-hexane (mineral oil)	5	1.7	2.5
Copper	3	0.003	0.004
Zinc	5	0.04	0.05
Soluble iron	10	0.8	0.9
Soluble manganese	10	0.10	0.12
Number of coliform groups	3000	56	150
Lead	0.1	N.D.	N.D.
Nickel	-	N.D.	N.D.
Tin	-	N.D.	N.D.
Barium	-	0.09	0.22
Dichloromethane	0.2	N.D.	N.D.
Carbon tetrachloride	0.02	N.D.	N.D.
1,2-dichloroethane	3	N.D.	N.D.
1,1,1-trichloroethane	0.06	N.D.	N.D.
1,1,2-trichloroethane	0.2	N.D.	N.D.
1,1-dichloroethylene	0.3	0.008	0.035
Trichloroethylene	0.1	N.D.	N.D.

Unit: pH, none; number of coliform groups, number/cc; others, mg/ℓ  
 pH: hydrogen ion concentration  
 COD: Chemical Oxygen Demand  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 1: The minimum to maximum pH values.  
 [Target level]: No particular standard value per currently effective laws or regulations.

### Air quality data:

No facility or equipment subjected to a relevant law or regulation is present, and no measurement is performed for this purpose

### Amount released or transported of substances to be subjected to PRTR:

Any substances to be subjected to PRTR is used in an amount that necessitates registration.

## Wakura Murata Manufacturing Co., Ltd.

1, U, Ishizaki-machi, Nanao-shi, Ishikawa 926-0173, Japan  
 Electricity consumption: 4,497,384 kWh/year  
 Fuel consumption: 126 *kℓ*/year  
 Total waste released: 277 metric tons/year  
 (Recycling ratio: 54.6%)

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	7.6	7.0-8.1*1
SS	90	7	30
COD	40	8	27
BOD	40	4	19
n-hexane (mineral oil)	5	0.3	1.4
Copper	3	0.010	0.023
Number of coliform groups	3000	71	520
Total nitrogen	120	7	29
Total phosphorus	16	0.6	2.6
Lead	0.1	N.D.	0.01

Unit: pH, none; number of coliform groups, number/cc; others, mg/ℓ  
 pH: hydrogen ion concentration  
 COD: Chemical Oxygen Demand  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 \*1: The minimum to maximum pH values.

### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.3	N.D.	N.D.
SOx	1.5	N.D.	N.D.
NOx	180	72	77

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm  
 N.D.: not greater than minimum limit of detection (Not Detected)

### Amount released or transported of substances to be subjected to PRTR:

Chemical compound name	Amount released				Amount transferred		
	Atmosphere	Public waters	Soil	Landfill	Sewage	Waste	Recycling
Bisphenol A type liquid-epoxy resin	0.0	0.0	0.0	0.0	0.0	1.3	0.0
Lead and its compounds	0.0	0.0	0.0	0.0	0.0	0.1	5.9

Unit: metric tons/year

## Anamizu Electronics Industries, Ltd.

Chi-53, Ohmachi, Anamizu-machi, Fugeshi-gun, Ishikawa 927-0026, Japan  
 Electricity consumption: 2,182,590 kWh/year  
 Fuel consumption: 27 kℓ/year  
 Total waste released: 101 metric tons/year  
 (Recycling ratio: 48.2%)

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	7.4	6.9-7.6* <sup>1</sup>
SS	200	18	36
COD	80	28	47
n-hexane (mineral oil)	5	0.7	1.3
Zinc	5	0.05	0.09
Soluble iron	10	0.19	0.52
Lead	0.1	0.01	0.04
Fluorine and its compounds	15* <sup>2</sup>	0.1	0.4
Boron and its compounds	25* <sup>2</sup>	0.01	0.02
Ammonia			
Ammonium compounds	730* <sup>2</sup>	9.5	15.8
Nitrite compounds and nitrate compounds			
Nickel	-	0.01	0.13

Unit: pH, none; others, mg/ℓ

pH: hydrogen ion concentration

COD: Chemical Oxygen Demand

N.D.: not greater than minimum limit of detection (Not Detected)

\*<sup>1</sup>: The minimum to maximum pH values.

\*<sup>2</sup>: The target levels for fluorine, fluorine compounds, boron, boron compounds, ammonia, and ammonium compounds, nitrite compounds and nitrate compounds are the temporary requirements for the electronic components manufacturing industry in Japan, that were stipulated by the associated law and will remain effective to June 30, 2004.

\*[Target level]: No particular standard value per currently effective laws or regulations.

### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.3	N.D.	N.D.
SOx	1.1	0.009	0.018
NOx	180	74	75

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm

N.D.: not greater than minimum limit of detection (Not Detected)

### Amount released or transported of substances to be subjected to PRTR:

Chemical compound name	Amount released				Amount transferred		
	Atmosphere	Public waters	Soil	Landfill	Sewage	Waste	Recycling
Lead and its compounds	0.0	0.0	0.0	0.0	0.0	0.0	22.7

Unit: metric tons/year

## Asuwa Electronics Industries, Ltd.

1321, Emorinaka 2-chome, Fukui-shi, Fukui 918-8025, Japan  
 Electricity consumption: 784,032 kWh/year  
 Fuel consumption: none  
 Total waste released: 13 metric tons/year  
 (Recycling ratio: 32.8%)

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	7.8	7.5-8.1* <sup>1</sup>
SS	200	10	13
BOD	160	9	17
n-hexane (mineral oil)	5	N.D.	N.D.
Number of coliform groups	3000	3	6
Cadmium	0.1	N.D.	N.D.
Lead	0.1	N.D.	N.D.
Dichloromethane	0.2	N.D.	N.D.
Carbon tetrachloride	0.02	N.D.	N.D.
1,2-dichloroethane	0.04	N.D.	N.D.
1,1,1-trichloroethane	3	N.D.	N.D.
1,1,2-trichloroethane	0.06	N.D.	N.D.
1,1-dichloroethylene	0.2	N.D.	N.D.
Trichloroethylene	0.3	N.D.	N.D.
Tetrachloroethylene	0.1	N.D.	N.D.
Benzene	0.1	N.D.	N.D.

Unit: pH, none; number of coliform groups, number/cc; others, mg/ℓ

pH: hydrogen ion concentration

BOD: Biochemical Oxygen Demand

N.D.: not greater than minimum limit of detection (Not Detected)

\*<sup>1</sup>: The minimum to maximum pH values.

### Air quality data:

No facility or equipment subjected to a relevant law or regulation is present, and no measurement is performed for this purpose

Amount released or transported of substances to be subjected to PRTR:  
 Any substances to be subjected to PRTR is used in an amount that necessitates registration.

## Tome Murata Manufacturing Co., Ltd.

11-1, Nakae 4-chome, Sanuma, Hasama-cho, Tome-gun, Miyagi 987-0511, Japan  
 Electricity consumption: 4,577,382 kWh/year  
 Fuel consumption: 154 kℓ/year  
 Total waste released: 38 metric tons/year  
 (Recycling ratio: 59.7%)

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.0-9.0	5.9	5.3-6.3* <sup>1</sup>
SS	600	72	91
COD	-	84	170
BOD	600	194	400
n-hexane (animal and plant)	30	7	13
Copper	3	0.014	0.021
Zinc	5	0.048	0.072
Fluorine and its compounds	8	N.D.	N.D.
Boron and its compounds	10	0.04	0.04
Contents ammonia nitrogen, nitrile nitrogen and nitrate nitrogen	380	N.D.	N.D.

Unit: pH, none; others, mg/ℓ

pH: hydrogen ion concentration

COD: Chemical Oxygen Demand

BOD: Biochemical Oxygen Demand

N.D.: not greater than minimum limit of detection (Not Detected)

\*<sup>1</sup>: The minimum to maximum pH values.

\*[Target level]: No particular standard value per currently effective laws or regulations.

### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.3	0.008	0.009
SOx	2.96	0.039	0.054
NOx	180	71	73

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm

Level of pollution was measured at several locations, each location given a unique target level. For safe evaluation, the strictest level is adopted.

Amount released or transported of substances to be subjected to PRTR:  
 Any substances to be subjected to PRTR is used in an amount that necessitates registration.

# Environmental Data by Murata Plants

## Azumi Murata Manufacturing Co., Ltd.

1020, Takibe, Toyoshina-machi, Minamiazumi-gun, Nagano 399-8294, Japan  
 Electricity consumption: 8,907,240 kWh/year  
 Fuel consumption: 226 kℓ/year  
 Total waste released: 262 metric tons/year  
 (Recycling ratio: 33.2%)

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.8-8.6	7.3	6.9-7.7*1
SS	50	4	5
COD	30	6.3	9.3
BOD	60	4.5	7.0
n-hexane (mineral oil)	5	0.4	0.9
Copper	3	0.004	0.013
Zinc	5	0.09	0.17
Soluble iron	10	0.9	1.7
Lead	0.005	N.D.	N.D.

Unit: pH, none; others, mg/ℓ  
 pH: hydrogen ion concentration  
 COD: Chemical Oxygen Demand  
 BOD: Biochemical Oxygen Demand  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 \*1: The minimum to maximum pH values.

### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Soot and dust	0.1	0.0007	0.0031
SOx	6.3	0.015	0.025
NOx	150	82	96

Unit: soot and dust, g/Nm<sup>3</sup>; SOx, Nm<sup>3</sup>/h; NOx, ppm

### Amount released or transported of substances to be subjected to PRTR:

Chemical compound name	Amount released				Amount transferred		
	Atmosphere	Public waters	Soil	Landfill	Sewage	Waste	Recycling
Nickel compounds	0.0	0.0	0.0	0.0	0.0	5.4	0.1

Unit: metric tons/year

## Murata Electronics North America, Inc. State College Operations

1900 W. College Avenue  
 State College, PA 16801-2799 USA  
 Electricity consumption: 28,761,168 kWh/year  
 Fuel consumption: 594 kℓ/year  
 Total waste released: 628 metric tons/year  
 (Recycling ratio: 27.5%)

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
BOD	-	22	42
Zinc	1.48	0.008	0.013
Total chromium	1.71	N.D.	N.D.
Hexavalent chromium	1.5	N.D.	N.D.
Copper	2.07	N.D.	N.D.
Cadmium	0.25	N.D.	N.D.
Lead	0.43	N.D.	N.D.
Mercury	0.0002	N.D.	N.D.
Silver	0.24	N.D.	N.D.
Thallium	0.19	N.D.	N.D.
Total cyanide	0.65	N.D.	N.D.
Chloroform	0.08	N.D.	N.D.
Methylene chloride	1	N.D.	N.D.
Toluene	0.5	0.001	0.004
Barium	-	0.9	4.5
DBP	-	0.4	1.4
Nickel	3.1	0.01	0.09
Tin	-	1	8
Xylene	2.1	N.D.	N.D.
1,1,1-trichloroethane	1.5	N.D.	N.D.
g-BHC	0.003	N.D.	N.D.
DOP	-	0.04	0.20

Unit: mg/ℓ  
 BOD: Biochemical Oxygen Demand  
 DBP: di-n-butyl phthalate  
 g-BHC: g-benzenehexachloride (lindane)  
 DOP: Bis (2-Ethylhexy) phthalate  
 N.D.: not greater than minimum limit of detection (Not Detected)  
 [Target level]: No particular standard value per currently effective laws or regulations.

### Air quality data:

No facility or equipment subjected to a relevant law or regulation is present, and no measurement is performed for this purpose

## Murata Amazônia Indústria E Comércio Ltda. Manaus Operation

Avenida Buriti 7040, Distrito Industrial  
 CEP:69075-000-Manaus AM Brazil  
 Electricity consumption: 541,854 kWh/year  
 Fuel consumption: none  
 Total waste released: 16 metric tons/year  
 (Recycling ratio: 13.5%)

### Water quality data:

No facility or equipment subjected to a relevant law or regulation is present, and no measurement is performed for this purpose

### Air quality data:

No facility or equipment subjected to a relevant law or regulation is present, and no measurement is performed for this purpose

### Murata Elektronik GmbH

Pestalozzistrabe 11, 91572 Bechhofen, Germany  
Electricity consumption: 1,749,913 kWh/year  
Fuel consumption: 77 kℓ/year  
Total waste released: 57 metric tons/year  
(Recycling ratio: 46.1%)

#### Water quality data:

No facility or equipment subjected to a relevant law or regulation is present, and no measurement is performed for this purpose

#### Air quality data:

No facility or equipment subjected to a relevant law or regulation is present, and no measurement is performed for this purpose

### Murata Manufacturing (UK) Limited

Thornbury Road, Estover Plymouth, Devon PL6 7PP, United Kingdom  
Electricity consumption: 1,385,998 kWh/year  
Fuel consumption: 74 kℓ/year  
Total waste released: 77 metric tons/year  
(Recycling ratio: 75.9%)

#### Water quality data:

No facility or equipment subjected to a relevant law or regulation is present, and no measurement is performed for this purpose

#### Air quality data:

No facility or equipment subjected to a relevant law or regulation is present, and no measurement is performed for this purpose

### Beijing Murata Electronics Co., Ltd.

No. 11 Tianzhu Road, Tianzhu Airport Industry Zone, Shunyi, Beijing 101312, China  
Electricity consumption: 5,029,200 kWh/year  
Fuel consumption: none  
Total waste released: 70 metric tons/year  
(Recycling ratio: 60.0%)

#### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	6.0-8.5	8.0	7.9-8.0*1
SS	50	N.D.	N.D.
COD	60	51	55
Nickel	0.5	0.01	0.01

Unit: pH, none; others, mg/ℓ  
pH: hydrogen ion concentration  
COD: Chemical Oxygen Demand  
N.D.: not greater than minimum limit of detection (Not Detected)  
\*1: The minimum to maximum pH values.

#### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Organic matters belonging to hydrocarbon groups other than methanes	120	0.09	0.11

Unit: mg/Nm<sup>3</sup>

# Environmental Data by Murata Plants

## Wuxi Murata Electronics Co., Ltd.

Lot 123-135, Xingchuang 1st Road, Wuxi-Singapore Industrial Park, Wuxi, Jiangsu 214028, China  
 Electricity consumption: 3,812,040 kWh/year  
 Fuel consumption: 62 *kℓ*/year  
 Total waste released: 105 metric tons/year  
 (Recycling ratio: 70.5%)

### Water quality data:

No facility or equipment subjected to a relevant law or regulation is present, and no measurement is performed for this purpose.

### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Dust	40	29	29
NOx	200	139	139
SOx	200	17	17

Unit: mg/Nm<sup>3</sup>

## Taiwan Murata Electronics Co., Ltd.

Taiwan Murata Electronics Co., Ltd.  
 225 Chung-Chin Road, Taichung, Taiwan  
 Electricity consumption: 6,640,002 kWh/year  
 Fuel consumption: 1.3 *kℓ*/year  
 Total waste released: 261 metric tons/year

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	6.0-9.0	7.4	7.4
SS	80	18	26
COD	250	58.3	67.3
BOD	80	18.2	27.6
Temperature	35	28.9	32.8
Number of coliform groups	-	370	640
Dissolved Oxygen (DO)	3 min.	5.2	4.2* <sup>1</sup>

Unit: pH, none; number of coliform groups, number/cc; temperature, °C; others, mg/ℓ  
 pH: hydrogen ion concentration  
 COD: Chemical Oxygen Demand  
 BOD: Biochemical Oxygen Demand  
 \*1: The minimum Dissolved Oxygen (DO) value.  
 [Target level]: No particular standard value per currently

### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Dust (emission point (1))	500	186	285
Dust (emission point (2))	399	N.D.	N.D.
Lead (emission point (2))	10	N.D.	N.D.

Unit: mg/Nm<sup>3</sup>  
 N.D.: not greater than minimum limit of detection (Not Detected)

## Murata Electronics Singapore (Pte.) Ltd.

200 Yishun Avenue 7, Singapore 768927, Singapore  
 Electricity consumption: 56,213,440 kWh/year  
 Fuel consumption: none  
 Total waste released: 1,000 metric tons/year  
 (Recycling ratio: 41.3%)

### Water quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	6.0-9.0	7.7	7.3-8.3* <sup>1</sup>
SS	400	27	115
COD	600	146	290
BOD	400	41	95
TDS	3000	2460	3000
Sulfate	1000	665	1220* <sup>2</sup>
Fat and oil (hydrocarbon)	60	N.D.	1
Fat and oil (glyceride)	100	4	24
Barium	10	N.D.	0.1
Nickel	10	0.9	2.1
Tin	10	N.D.	0.4

Unit: pH, none; others, mg/ℓ  
 pH: hydrogen ion concentration  
 COD: Chemical Oxygen Demand  
 BOD: Biochemical Oxygen Demand  
 \*1: The minimum to maximum pH values.  
 \*2: The maximum value fluctuated temporarily due to an occasionally large amount of pH adjusting chemical added at the wastewater treatment facility. Except this situation, the sulfate concentration always satisfied the target level.

### Air quality data:

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Ammonia and ammonium compounds	6.0-9.0	7.7	7.3-8.3* <sup>1</sup>
Hydrogen sulfide	400	27	115
Dust	600	146	290
CO	400	41	95
Nitrogen oxide (as NO <sub>2</sub> )	3000	2460	3000
Copper and its compounds	1000	665	1220* <sup>2</sup>
	60	N.D.	1

Unit: mg/Nm<sup>3</sup>  
 N.D.: not greater than minimum limit of detection (Not Detected)

**Murata Electronics (Thailand), Ltd.**

Northern Region Industrial Estate, 63 Moo 4, Tambol  
Ban-Klang, Amphur Muang, Lamphun 51000, Thailand  
Electricity consumption: 28,415,998 kWh/year  
Fuel consumption: none  
Total waste released: 1,635 metric tons/year  
(Recycling ratio: 28.8%)

**Water quality data:**

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.5-9.0	7.5	6.98.0*1
SS	200	70	183
COD	750	242	488
BOD	500	123	269
TDS	3000	297	427
TKN	100	39.0	51.8
Phenol	1	0.02	0.04
Copper	2	0.04	0.17
Zinc	5	0.15	0.19
Total iron	10	0.12	0.15
Trivalent chromium	0.75	N.D.	N.D.
Hexavalent chromium	0.25	N.D.	N.D.
Lead	0.2	0.01	0.05
Fluoride	5	0.32	0.35
Sulfide	1	0.06	0.28
Cadmium	0.03	N.D.	N.D.
Selenium	0.02	N.D.	N.D.
Barium	1	N.D.	N.D.
Nickel	1	N.D.	N.D.
Formaldehyde	1	0.04	0.06
Chloride	2000	65	80
Free chlorine	1	N.D.	N.D.
Oils and grease	10	0.3	1.4
Surfactants	30	0.07	0.08
Odor	Not perceived	Satisfactory	-
Color	No color	Satisfactory	-
Temperature	45	Satisfactory	-

Unit: pH, none; temperature, °C; others, mg/ℓ  
pH: hydrogen ion concentration  
COD: Chemical Oxygen Demand  
BOD: Biochemical Oxygen Demand  
TDS: Total Dissolved Nitrogen  
TKN: Total Kjeldahl Nitrogen  
N.D.: not greater than minimum limit of detection (Not Detected)  
\*1: The minimum to maximum pH values.

**Air quality data:**

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Dust	400	44	324
Antimony	20	0.05	0.09
Arsenic	20	N.D.	N.D.
Lead	30	0.1	0.4
Chlorine	30	0.002	0.002
Hydrogen chloride	200	8	8
Mercury	3	N.D.	N.D.
Carbon monoxide	1,000	47	465
Sulfuric acid	100	18	35
Hydrogen sulfide	140	N.D.	N.D.
Sulfur dioxide	1,300	5	20
Nitrogen dioxide	470	7	37
Xylene	870	2	3

Unit: mg/Nm<sup>3</sup>  
N.D.: not greater than minimum limit of detection (Not Detected)

**Murata Electronics (Malaysia) Sdn. Bhd.**

Plot 15, Bemban Industrial Park, Jalan Bemban, 31000  
Batu Gajah, Perak, Malaysia  
Electricity consumption: 5,513,542 kWh/year  
Fuel consumption: 6 kℓ/year  
Total waste released: 289 metric tons/year  
(Recycling ratio: 80.1%)

**Water quality data:**

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
pH	5.5-9.0	7.0	6.6-7.7*1
SS	100	28	52
COD	100	56	100
BOD	50	23	42
Oils and grease	10	N.D.	N.D.

Unit: pH, none; others, mg/ℓ  
pH: hydrogen ion concentration  
COD: Chemical Oxygen Demand  
BOD: Biochemical Oxygen Demand  
N.D.: not greater than minimum limit of detection (Not Detected)  
\*1: The minimum to maximum pH values.

**Air quality data:**

The management level is strictly enough to meet the target level.

Item	Target level	Average	Max. value
Lead	25	N.D.	N.D.
SPM	400	N.D.	N.D.

Unit: mg/Nm<sup>3</sup>  
SPM: Suspended Particulate Matter  
N.D.: not greater than minimum limit of detection (Not Detected)



Murata  
Manufacturing Co., Ltd.