Control of Chemical Substances

Targets

- Reduce use of chlorinated organic solvents in wash by at least 70% in fiscal 2003, with goal of elimination of these solvents by the end of fiscal 2006.

Chemical substances have the potential to improve our lives in many ways, but at the same time can cause many serious problems such as ozone layer depletion, dioxin poisoning and the environmental endocrine effect — the spread of harmful elements throughout nature. In order to forestall this sort of damage, it is vital that the use of chemical substances be carefully controlled, that the amount of chemicals used is reduced, and that safer substances are substituted wherever possible.

Nikon is currently devising a management system that will enable us to effectively take all of these actions.

Substance Control Procedures

Nikon performs chemical substance control at every phase of the product life cycle, from purchase through use and disposal, in order to stop pollution caused by these substances. When first purchasing a new chemical substance, we obtain a Material Safety Data Sheet (MSDS) for the item, and carry out an assessment of the potential dangers of its use in the workplace. Based on the results of this assessment, our Environment, Safety and Hygienics section performs a review and confirmation of actions taken.

In addition to these measures, our Data Centre, located at the Ohi Plant, carries out intensive management of registration, updates and storage of MSDS.

Nikon's PRTR

The Pollutant Release and Transfer Register (PRTR) Law has been enacted in Japan as well, and daily management of chemical substances and diligent risk management are key factors in promoting business.

The "Nikon PRTR Guide" was released in March 2000, and management activity for the specified chemical substances is underway at each plant. This guide serves as a safety management standard which clearly outlines handling and disposal according to MSDS, for all product phases from procurement to use and disposal.

In March 2002, Nikon established a company system for legal notification, adding to and revising existing procedures for filling out such notifications.

In accordance with applicable laws, the fiscal 2003 report required reporting of quantities of five tons or more. No such reporting was necessary for any of our plants.

Nikon PRTR Guide

PRTR Survey Results for fiscal 2003

Unit: kg/year

Facility	Substance No.	Substance name	Volume handled	Amount released			Amount transferred		Amount in on-site landfill	Amount removed for processing	Amount shipped in product
				Air	Public water	Soil	Sewage	Waste			
Yokohama Plant	145	Dichloromethane	3,597	3,519	0	0	0	78	0	0	0
Sagamihara Plant	145	Dichloromethane	1,600	1,386	0	0	0	214	0	0	0
	230	Lead and lead compounds	1,648	1	0	0	0	674	0	0	973
	304	Boron and boron compounds	1,916	1	0	0	0	782	0	0	1,133
Kumagaya Plant	227	Toluene	1,285	711	0	0	0	574	0	0	0
Total	145	Dichloromethane	5,197	4,905	0	0	0	292	0	0	0
	227	Toluene	1,285	711	0	0	0	574	0	0	0
	230	Lead and lead compounds	1,648	1	0	0	0	674	0	0	973
	304	Boron and boron compounds	1,916	1	0	0	0	782	0	0	1,133

* The above table includes data only for specified substances of which one or more tons are handled per year per facility. No such substances exist at the Ohi and Mito Plants.

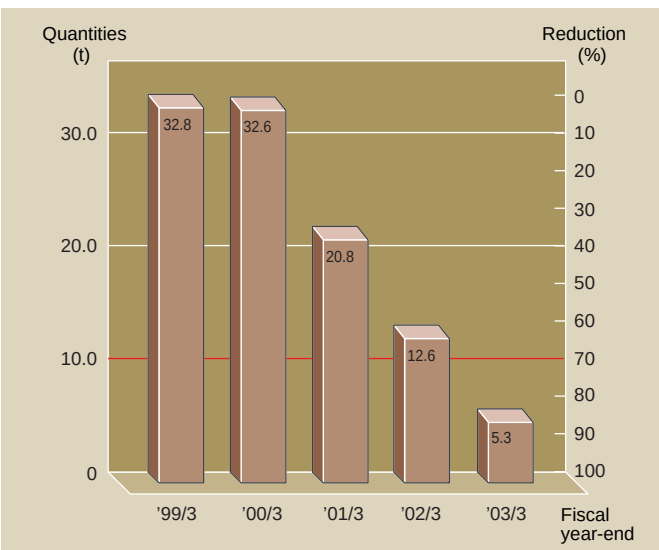
Reduction in Chemical Substances

The key question is how to best reduce the amount of chemical substances used. This is more than merely avoiding the risk of environmental pollution, and in fact signifies an improvement in Nikon's design and production systems. We are constantly working to reduce the volume of chemical substances used which have the most adverse effects on the environment, searching for alternatives, and making every effort to achieve zero chemical pollution.

Efforts to eliminate chlorinated organic solvents

We have established a target for total elimination of chlorinated organic solvents in wash applications by the end of fiscal 2006, and are now switching over to hydrocarbon wash agents and similar substances that have minimal effect on the environment.

The graph at right shows amounts used since fiscal 1999. The amount used in fiscal 2003 was 84% less than in fiscal 1999 — we achieved our goal of a reduction of no less than 70%.



Prevention of Pollution and Protection of Air and Water

To help preserve air and water quality, Nikon not only observes applicable laws and regulations, but has also established its own independent plant standards for management.

Each plant regularly measures pollutants released into the air and water, and inspects equipment such as boilers and waste water processing systems periodically to ensure safety.

Air and Water Quality Environmental Data for Fiscal 2003

Ohi Plant

1-6-3, Nishi-Ohi, Shinagawa-ku, Tokyo 140-8601
+81-3-3773-1307

Air (Air Pollution Control Law, Metropolitan Regulations)

Unit: Dust: g/Nm³, NOx (nitrous oxides): ppm

Item		Regulatory standard	Plant standard	Actual (max.)
Boiler	Dust	0.15	0.12	0.003
	NOx	45	45	39

*1 Occurred August 2002 (exceeded pH and SS regulatory standards)
Cause: An error in the drainage switching operation resulted in the draining of water contaminated with polishing components.
Corrective action: Drained through treatment plant, bypassing drain switching operations.

*2 Occurred March 2003 (exceeded regulatory standard)
Cause: Kitchen-implement cleansers used in kitchen melted oil and fats.
Corrective action: 1. Improve gas burner to prevent burning.
2. When kitchen-implement cleansers are used, they must be drained through a treatment plant.

Water Quality (Sewerage Law, Metropolitan Regulations)

Unit: mg/l, except for pH

	Item	Regulatory standard	Plant standard	Actual (max.)
Living environment	pH	5.8-8.6	5.9-8.5	6.2~9.1 *1
	BOD	300.0	240.0	55.2
	SS	300.0	240.0	586 *1
	n-hexane (animal/vegetable)	30.0	24.0	35.8 *2
	Iodine demand	220.0	176.0	46.1
	Copper	3.0	2.4	0.1
	Zinc	5.0	4.0	0.6
	Soluble iron	10.0	8.0	0.5
	Total chrome	2.0	1.6	0.0
	Fluorine	15.0	12.0	3.6
	Nitrogen	120.0	96.0	19
	Phosphorous	16.0	12.8	0.73
Health	Lead	0.1	0.08	0.0
	Dichloromethane	0.2	0.16	0.0

Yokohama Plant

471 Nagaodai-cho, Sakae-ku, Yokohama, Kanagawa 244-8533
+81-45-852-2111

Air (Air Pollution Control Law, Prefectural Regulations)

Unit: NOx (nitrous oxides): ppm

Item		Regulatory standard	Plant standard	Actual (max.)
Boiler	NOx	65	60	**38**
		65	60	**43**
		65	60	**38**
		46	42	**27**
		46	42	**40**
		46	42	**31**

*1 Occurred November 2002 (exceeded regulatory standard)
Cause: Oil and fats were mixed while refilling high-polymer coagulant.
Corrective action: Ensured proper procedure followed when refilling coagulant, and changed to different coagulant.

*2 Occurred August 2002 (exceeded regulatory standard)
Cause: More waste water was drained in the hydrofluoric acid flush process via high-density draining than was intended.
Corrective action: Installed preliminary water tank before the hydrofluoric acid flush process, and outsourced disposal of waste water from the tank.

Water Quality (Sewerage Law, Prefectural Regulations, City Regulations)

Unit: mg/l, except for pH

	Item	Regulatory standard	Plant standard	Actual (max.)
Living environment	pH	5.0-9.0	5.5-8.5	**5.8~7.5**
	BOD	600.0	540.0	**17.5**
	SS	600.0	540.0	**26.0**
	n-hexane (mineral)	5.0	4.5	**7.2** *1
	Iodine demand	220.0	200.0	**56.3**
	Copper	1.0	0.9	**0.0**
	Zinc	1.0	0.9	**0.0**
	Soluble iron	3.0	2.7	**0.1**
	Soluble manganese	1.0	0.9	**0.0**
	Total chrome	2.0	1.0	**0.0**
	Nickel	1.0	0.9	**0.0**
	Fluorine	8.0	7.0	**8.9** *2
	Boron	10.0	8.0	**0.3**
Health	Lead	0.1	0.1	**0.02**
	Arsenic	0.1	0.1	**0.00**
	Hexavalent chrome	0.5	0.4	**0.00**
	Trichloroethylene	0.3	0.2	**0.00**
	Tetrachloroethylene	0.1	0.1	**0.00**
	Dichloromethane	0.2	0.1	**0.00**

* For explanations of terms such as ppm and pH, see glossary on page 24.

Sagamihara Plant

1-10-1 Asamizodai, Sagamihara, Kanagawa 228-0828
+81-42-740-6300

Air (Air Pollution Control Law, Prefectural Regulations)

Unit: Dust: g/Nm^3, NOx (nitrous oxides): ppm

Item		Regulatory standard	Plant standard	Actual (max.)
Boiler	Dust	0.15	0.1	0.0026
		0.15	0.1	0.0023
		0.15	0.1	0.0012
		0.15	0.1	0.0022
		0.15	0.1	0.0023
		0.15	0.1	0.005
	NOx	105	100	51
		105	100	75
		105	100	84
		105	100	8
		105	100	10
		105	100	5

Water Quality (Sewerage Law, Prefectural Regulations)

Unit: mg/l, except for pH

Item		Regulatory standard	Plant standard	Actual (max.)
Living environment	pH	5.7～8.7	6.0～8.0	6.4～7.5
	BOD	300.0	60.0	9
	SS	300.0	90.0	<10
	Zinc	3.0	0.5	0.07
	Fluorine	12.0	10.0	6.9
	Boron	10.0	5.0	0.02
	Ammoniac nitrogen	100.0	100.0	14
Health	Lead	0.1	0.08	0.09 *1
	Arsenic	0.1	0.05	<0.01
	Dichloromethane	0.2	0.1	0.007

*1 Occurred November 2002 (exceeded plant standard)
Cause: Chemical (coagulant of lead) was not constantly provided due to a technical malfunction in the chemical pump.
Corrective action: Replaced the chemical pump.

Kumagaya Plant

201-9 Oaza-miizugahara, Kumagaya, Saitama 360-8559
+81-48-533-2111

Air (Air Pollution Control Law, Prefectural Regulations)

Unit: Dust: g/Nm^3, NOx (nitrous oxides): ppm

Item		Regulatory standard	Plant standard	Actual (max.)
Boiler	Dust	0.1	0.05	0.003
		0.1	0.05	0.001
		0.1	0.05	0.001
		0.1	0.05	0.001
		0.1	0.05	0.001
		0.1	0.05	0.001
		0.1	0.05	0.001
		0.1	0.05	0.001
		0.1	0.05	0.001
		0.1	0.05	0.001
		0.1	0.05	0.003
	NOx	150	100	46
		150	100	37
		150	100	36
		150	100	48
		150	100	45
		150	100	64
		150	100	75
		150	100	49
		150	100	114 *1
		150	100	52
		150	100	58

Water Quality (Sewerage Law, Prefectural Regulations)

Unit: mg/l, except for pH

Item		Regulatory standard	Plant standard	Actual (max.)
Living environment	pH	5.1～8.9	5.9～8.2	6.2～7.3
	BOD	600.0	150.0	32.0
	SS	600.0	50.0	13.0
	n-hexane (mineral)	5.0	4.0	<1.0
	n-hexane (animal/vegetable)	30.0	20.0	4.0
	Iodine demand	220.0	170.0	13.0
	Copper	3.0	0.5	<0.2
	Zinc	5.0	0.5	<0.05
	Soluble iron	10.0	3.0	<0.3
	Total chrome	2.0	1.0	<0.2
	Fluorine	8.0	2.5	<0.5
	Boron	10.0	4.0	1.2
	Nitrogen	240.0	60.0	28.0
	Ammoniac nitrogen	100.0	30.0	22.0
	Phosphorous	32.0	15.0	5.3
Health	Cyanide	1.0	0.2	<0.1
	Lead	0.1	0.1	<0.01
	Hexavalent chrome	0.5	0.1	<0.05

*1 Occurred March 2003 (exceeded plant standard)
Cause: Improper combustion adjustment.
Corrective action: Task will be postponed until the middle of November 2003. Prior to beginning the corrective action, the machine will be dismantled and the necessary re-adjustment made.

Mito Plant

276-6 Motoishikawa-cho, Mito, Ibaraki 310-0843
+81-29-240-1112

Air (Air Pollution Control Law, Prefectural Regulations)

Unit: Dust: g/Nm³, NOx (nitrous oxides): ppm, SOx (sulfurous oxides): Nm³/h

Item		Regulatory standard	Plant standard	Actual (max.)
Boiler	Dust	0.3	0.27	**0.010**
		0.3	0.27	**0.021**
		0.3	0.27	**0.009**
	NOx	180	162	**78**
		180	162	**78**
		180	162	**93**
	SOx	3.25	0.67	**0.074**
		3.25	0.67	**0.077**
		3.25	0.67	**0.059**

Water Quality (Water Pollution Control Law, Prefectural Regulations)

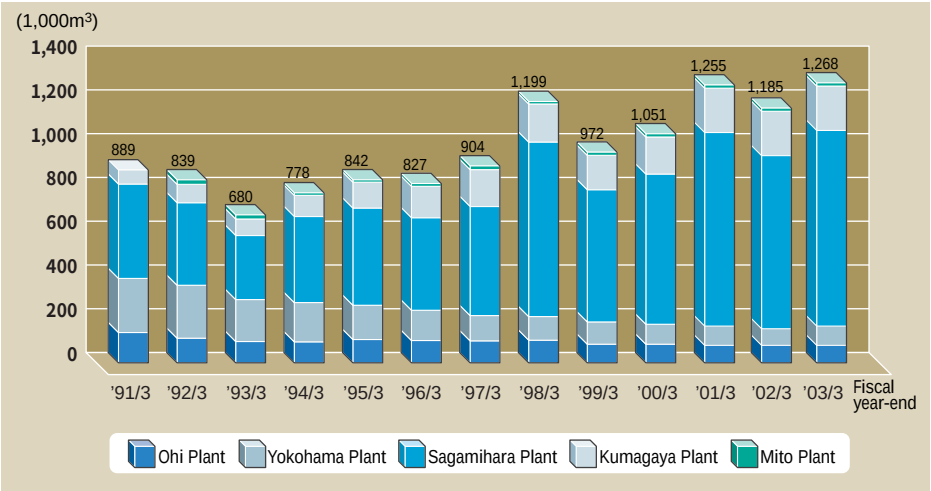
Unit: mg/l, except for pH and E. coli (colonies/ml)

Item		Regulatory standard	Plant standard	Actual (max.)
Living environment	pH	**5.8～8.6**	**6.0～8.2**	**6.9～7.3**
	BOD	**20.0**	**20.0**	**15.0**
	SS	**30.0**	**30.0**	**27.0**
	n-hexane (animal/vegetable)	**10.0**	**10.0**	**1.3**
	E. coli (daily average)	**3,000.0**	**2,700.0**	**17**
	Nitrogen	**60.0**	**60.0**	**52.7**
	Phosphorous	**8.0**	**8.0**	**5.22**

Water Usage

Plants engaged in manufacturing continuously expand and evolve structurally, but since the introduction of the "Environmental Management System" in fiscal 1999, efforts have been made to promote reuse of process waste water, and reduce water usage by involving all employees in water-saving activities.

However, the Sagamihara plant saw an increase in water usage in fiscal 2003 due to a change in the manufacturing process. To counter this, the draining of indirect coolant (180km³) was re-routed to rivers with the permission of a local self-governing agency, to reduce the load on the sewer system.



Glossary

ppm: Parts per million

pH: Hydrogen ion concentration
Indicates the acidity or alkalinity of a substance, where a solution of pH 0 to 7 is acid, pH of 7 is neutral, and a pH over 7 is alkaline. A change of one pH number indicates a 10-fold change in the concentration of hydrogen ions.

BOD: Biochemical oxygen demand
The amount of oxygen required for microorganisms to oxidise and consume organic pollutants in water. Used to gauge the degree of pollution of rivers.

SS: Suspended solids
Also referred to as substances that cause water clouding, they include small particles, plankton, organism carcasses and detritus, excretions and other organic materials, as well as sand, mud and inorganics and a range of man-made pollutants.

n-hexane (mineral or animal/vegetable): Normal hexane mass
Used to measure the total content of oils and hydrocarbons in waste water, it indicates the amount of materials extracted to normal hexane and which do not volatilise at about 100°C. Covers animal and vegetable oils, fatty acids, petroleum-based hydrocarbons, wax and grease.

Iodine demand
The amount of iodine used by the reducing substances (sulphide, etc.) in waste water during iodine oxidation. It is an index of the presence of the reducing substances in waste water.