Control of Chemical Substances

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 of earth and water, 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.

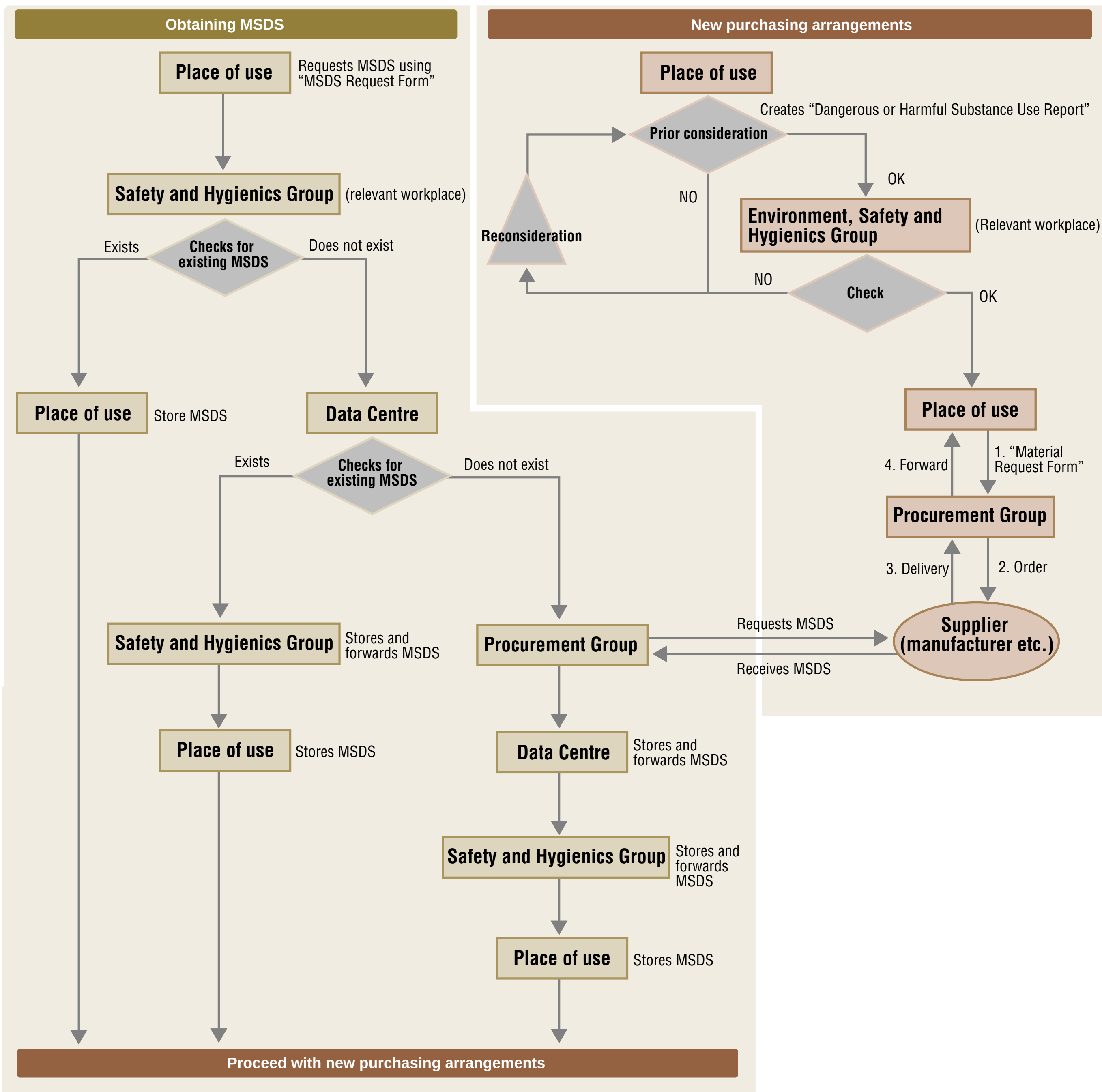
Nikon is currently devising a management system that will enable us to effectively take all of these actions.

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.

The process of obtaining MSDS and the purchasing of new chemical substances



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

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.

Nikon PRTR Guide

PRTR Survey Results for fiscal 2001

Unit: tons/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			
Ohi Plant	144	Dichloropenta fluoropropane	1.32	1.08	0.00	0.00	0.00	0.24	0.00	0.00	0.00
	145	Dichloromethane	1.11	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.36
Yokohama Plant	145	Dichloromethane	6.35	6.27	0.00	0.00	0.00	0.08	0.00	0.00	0.00
Sagamihara Plant	145	Dichloromethane	10.98	9.52	0.00	0.00	0.00	1.46	0.00	0.00	0.00
	230	Lead and lead compounds	9.69	0.01	0.00	0.00	0.00	5.70	0.00	0.00	3.99
	304	Boron and boron compounds	11.19	0.01	0.00	0.00	0.00	6.57	0.00	0.00	4.61
Kumagaya Plant	145	Dichloromethane	3.79	3.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	200	Tetrachloroethylene	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	227	Toluene	2.54	1.64	0.00	0.00	0.00	0.00	0.00	0.00	0.90
Total	144	Dichloropenta fluoropropane	1.32	1.08	0.00	0.00	0.00	0.24	0.00	0.00	0.00
	145	Dichloromethane	22.22	20.32	0.00	0.00	0.00	1.54	0.00	0.00	0.36
	200	Tetrachloroethylene	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	227	Toluene	2.54	1.64	0.00	0.00	0.00	0.00	0.00	0.00	0.90
	230	Lead and lead compounds	9.69	0.01	0.00	0.00	0.00	5.70	0.00	0.00	3.99
	304	Boron and boron compounds	11.19	0.01	0.00	0.00	0.00	6.57	0.00	0.00	4.61

* 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 Mito Plant.
* Waste transferred includes tonnage transferred off-site for disposal or processing, as well as for free or fee-based recycling.
* Amount removed for processing indicates change in substance due to neutralization, decomposition or reactive processing on-site.
* Amount shipped in product indicates tonnage shipped from the site in or accompanying products (finished and semi-finished products). Tonnages sold to external firms for recycling or eliminated through chemical processing are also included.

* PRTR
The Pollutant Release and Transfer Register (PRTR) is a framework for registering and publicly announcing transfer tonnages for harmful chemical substances, either released into the environment or transferred as waste for proper disposal. The appropriate government agency tracks, compiles and announces release tonnages (air, water, soil) and transfer tonnages (waste) for specified substances, based on enterprise reports and statistics.
In Japan, the PRTR became law on July 13, 1999, and it applied beginning with reports submitted during the year starting April 2001 with a notification date of April 2002 or later.

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 alternates, and making every effort to achieve zero chemical pollution.

1) CFC elimination

CFCs have been cited as one of the key factors in the deterioration of the ozone layer. Nikon established the "CFC Countermeasures Committee" in December 1988, and totally eliminated CFC usage in May 1994, well in advance of the December 1994 goal established in the "Montreal Protocol".

2) Efforts to eliminate chlorinated organic solvents

We have established a target for total elimination of chlorinated organic solvents in wash applications of the end of fiscal 2006, and are now switching over to hydrocarbon wash agents and similar substances that have minimal effect on the environment. In fiscal 2001, usage was reduced by 37% from fiscal 1999 levels.

A lens wash finishing system using IPA (isopropyl alcohol) instead of CFCs

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 2001

1. Location 2. Establishment 3. Number of employees 4. Outline
(As of March 31, 2001)

Ohi Plant

1. Nishi-Ohi, Shinagawa-ku, Tokyo 2. February 1, 1918
3. 1,462 4. Development of basic technology, development and design of Imaging Company products, etc.

Air (Air Pollution Control Law)

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

Item		Established standard	Plant standard	Actual (max.)
Boiler	Dust	0.3	0.28	0.003
		0.3	0.28	0.002
		0.15	0.14	0.002
	NOx	250	225	85
		250	225	82
		150	135	38

*1 Occurred May 2000 (exceeded plant standards)
Cause: Drainage of concrete wash water from construction site
Corrective action: Enforced observation of environmental checklist for on-site construction
*2 Occurred July 2000 (violated established standard)
Cause: Inspection and measurement failed to determine cause; thought to be due to foreign material present in original test sample
Corrective action: Soil emplaced around tank

Water Quality (Sewerage Regulations)

Unit: mg/l, except for pH

	Item	Established standard	Plant standard	Actual (max.)
Living environment	pH	5.8-8.6	5.9-8.5	6.3-8.6 *1
	BOD	300.0	285.0	129.3
	SS	300.0	285.0	1,316.2 *2
	n-hexane (animal/vegetable)	30.0	28.0	10.4
	Iodine demand	220.0	209.0	119.4
	Copper	3.0	2.8	0.1
	Zinc	5.0	4.7	1.4
	Soluble iron	10.0	9.5	7.5
	Total chrome	2.0	1.9	1.2
	Fluorine	15.0	14.2	2.2
	Nitrogen	120.0	114.0	60.2
	Phosphorous	16.0	15.0	3.2
Health	Cyanide	1.0	0.95	0.2
	Lead	0.1	0.09	0.08
	Hexavalent chrome	0.5	0.47	0.0
	Trichloroethylene	0.3	0.28	0.00
	Dichloromethane	0.2	0.19	0.00

Yokohama Plant

1. Nagaodai-machi, Sakae-ku, Yokohama, Kanagawa 2. June 9, 1967
3. 813 4. Development, design and manufacture of Instruments Company products, and LCD steppers

Air (Air Pollution Control Law, Prefectural Regulations)

Unit: NOx (nitrous oxides): ppm

Item		Established standard	Plant standard	Actual (max.)
Boiler	NO	65	60	40
		65	60	55
		65	60	34
		46	42	26
		46	42	45 *1
		46	42	32

*1 Occurred February 2001 (exceeded plant standards)
Cause: Improper low-NOx burner adjustment
Corrective action: Adjusted to 41 ppm; adjustment and measurement frequency increased to four times/year

Water Quality (Sewerage Law)

Unit: mg/l, except for pH

	Item	Established standard	Plant standard	Actual (max.)
Living environment	pH	5.0-9.0	5.5-8.5	6.6-7.5
	COD	600.0	540.0	0.0
	SS	600.0	540.0	0.0
	n-hexane (mineral)	5.0	4.5	1.2
	Iodine demand	220.0	200.0	53.3
	Copper	1.0	0.9	0.0
	Zinc	1.0	0.9	0.0
	Soluble iron	3.0	1.0	0.0
	Soluble manganese	1.0	0.9	0.0
	Total chrome	2.0	1.0	0.0
	Nickel	1.0	0.9	0.0
	Fluorine	15.0	13.0	1.2
	Nitrogen	240.0	135.0	2.5
	Phosphorous	32.0	18.0	2.50
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	0.01

* For explanations of terms such as ppm and pH, see glossary on page 22.

Sagamihara Plant

1. Asamizodai, Sagamihara, Kanagawa 2. July 5, 1971
3. 533 4. Manufacture of optical glass, R&D of lenses

Air (Air Pollution Control Law, Prefectural Regulations)

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

Item		Established standard	Plant standard	Actual (max.)
Boiler	Dust	0.15	0.1	0.0015
		0.15	0.1	0.0019
		0.15	0.1	0.0023
		0.15	0.1	0.0019
		0.15	0.1	0.0021
		0.15	0.1	0.0015
		0.15	0.1	0.0015
		0.15	0.1	0.005
	NOx	105	100	85
		105	100	95
		105	100	83
		105	100	89
		105	100	89
		105	100	6
		105	100	3
		105	100	<5

Water Quality (Sewerage Law, Prefectural Regulations)

Unit: mg/l, except for pH

	Item	Established standard	Plant standard	Actual (max.)
Living environment	pH	5.7-8.7	6.0-8.0	6.7-7.5
	BOD	300.0	60.0	≦29
	SS	300.0	90.0	<10
	Zinc	3.0	0.5	<0.05
	Fluorine	15.0	13.0	≦9.6
Health	Lead	0.1	0.08	≦0.14 *1
	Arsenic	0.1	0.05	<0.01
	Dichloromethane	0.2	0.1	≦0.053

*1 Occurred March 2001 (violated established standard)
Occurred once during weekly measurement
Cause: Wash water volume exceeded processing capacity
Corrective action: Improvements in cleaning precipitation pit

Kumagaya Plant

1. Oaza-miizugahara, Kumagaya, Saitama 2. December 1, 1984 3. 1,303
4. Development, design and manufacture of IC steppers

Air (Air Pollution Control Law, Prefectural Regulations)

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

Item		Established standard	Plant standard	Actual (max.)
Boiler	Dust	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	0.002
		0.1	0.05	0.002
		0.1	0.05	0.001
	NOx	150	100	26
		150	100	29
		150	100	36
		150	100	27
		150	100	26
		150	100	24
		150	100	31
		150	100	25
		150	100	28
		150	100	25
		150	100	30

Water Quality (Sewerage Law, Prefectural Regulations)

Unit: mg/l, except for pH

	Item	Established standard	Plant standard	Actual (max.)
Living environment	pH	5.1-8.9	5.9-8.2	6.2-7.4
	BOD	600.0	450.0	58.0
	SS	600.0	150.0	15.0
	n-hexane (mineral)	5.0	4.0	<1
	n-hexane (animal/vegetable)	30.0	30.0	2.0
	Iodine demand	220.0	220.0	210.0
	Copper	3.0	0.5	<0.02
	Zinc	5.0	0.5	<0.05
	Soluble iron	10.0	9.0	<0.3
	Total chrome	2.0	1.7	<0.2
	Fluorine	15.0	2.5	<0.5
	Nitrogen	240.0	60.0	48.0
	Phosphorous	32.0	20.0	11.00
Health	Cyanide	1.0	0.3	<0.1
	Lead	0.1	0.1	<0.01
	Hexavalent chrome	0.5	0.1	<0.05

Mito Plant

1. Motoishikawa-cho, Mito, Ibaraki 2. January 21, 1991
3. 290 4. Development of manufacturing technology, production of customised products

Air (Air Pollution Control Law, Prefectural Regulations)

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

Item		Established standard	Plant standard	Actual (max.)
Boiler	Dust	0.3	0.27	0.015
		0.3	0.27	0.031
		0.3	0.27	0.026
	NOx	180	162	67
		180	162	71
		180	162	87
	SOx	3.25	0.67	0.083
		3.25	0.67	0.031
		3.25	0.67	0.13

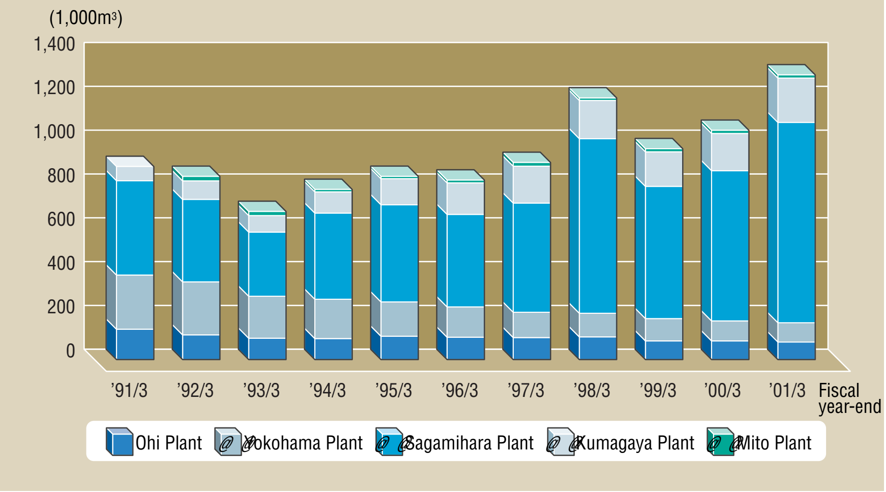
Water Quality (Water Pollution Control Law) Unit: mg/l, except for pH and E. coli (colonies/ml)

Item		Established standard	Plant standard	Actual (max.)
Living environment	pH	5.8-8.6	6.0-8.2	6.3-7.8
	BOD	160.0	20.0	15.0
	SS	200.0	30.0	12.0
	n-hexane (animal/vegetable)	30.0	10.0	1.8
	E. coli (daily average)	3,000.0	2,700.0	82.0
	Nitrogen	120.0	60.0	57.8
	Phosphorous	16.0	8.0	6.39
Health	Trichloroethylene	0.3	0.3	<0.001

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.

The sharp rise in production activity during fiscal 2001, however, resulted in the figures shown at right. We are working actively to promote water reuse and reduce consumption in the future.



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.

COD: Chemical oxygen demand
The amount of oxygen consumed to oxidise organic pollutants in water with an oxidiser. Indicates the degree of pollution of seas and lakes.

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 manmade 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.