4 Compliance with Regulations

The Yokogawa Group fully respects all legal regulations related to environmental protection, and also sets its own voluntary limits. In response to the PRTR law that took effect in April 2001 in Japan, an intensive program for reducing the use of controlled chemicals has been carried out. We also have investigated the statuses of pollution of soil and subterranean water in our plants' premises, drawn up handling regulations, and taken countermeasures.

1. Environmental Data at Each Site

The Yokogawa Group set voluntary limits in response to the Clean Air Law, Clean Water Law (both in Japan), and other legislation and pacts, and controls the specified values. The tables below show the emissions measured at each Japanese domestic site containing a specific facility that could cause atmospheric or water pollution. The measured values are compared with the limits allowed by the respective municipal regulations.

Headquarters: Musashino-shi, Tokyo, Japan (in semi-industrial zone)

■ Atmosphere

Substance	Facility	Legal Limit	Max. Measured Value
Nitrogen oxides (ppm)	Cooling/heating water generator	150	79
	Gas engine	600	234
Smoke and dust (g/Nm^3)	Cooling/heating water generator	0.03	0.0004
	Gas engine	0.04	0.0004
Hydrogen chloride (ppm)	Scrubber	25	Below detectable limit
Sulfuric acid (mg/Nm^3)	Scrubber	1	Below detectable limit
Trichloroethylene (ppm)	Cleaning bath	100	28
Tetrachloroethylene (ppm)	Cleaning bath	100	20

■ Water Purity

Substance		Legal Limit	Max. Measured Value
Cyanide (mg/liter)		1	Below detectable limit
Hexahydric chromium (mg/liter)		0.5	Below detectable limit
Copper compounds (mg/liter)		3	0.03
Fluorine compounds (mg/liter)		15	0.56
Trichloroethylene (mg/liter)		0.3	Below detectable limit
Tetrachloroethylene (mg/liter)		0.1	Below detectable limit
pH		5.8–8.6	6.2–7.3
Biochemical oxygen demand (BOD) (mg/liter)		300	82
Suspended solids (mg/liter)		300	85
Normal-hexane extracts (mg/liter)	Mineral oil	5	Below detectable limit
	Animal/vegetable oil	30	28

Kofu Plant: Kofu-shi, Yamanashi Pref., Japan (in industrial park)

■ Atmosphere

Substance	Facility	Legal Limit	Max. Measured Value
Nitrogen oxides (ppm)	Cooling/heating water generator	150	77
Smoke and dust (g/Nm^3)	Cooling/heating water generator	0.1	0.002

■ Water Purity

Substance	Legal Limit	Max. Measured Value
Cyanide (mg/liter)	0.1	*0.15
Hexahydric chromium (mg/liter)	0.05	Below detectable limit
Copper compounds (mg/liter)	1	0.11
Fluorine compounds (mg/liter)	1	0.6
All kinds of chromium compounds (mg/liter)	0.5	Below detectable limit
Trichloroethylene (mg/liter)	0.3	Below detectable limit
Dichloromethane (mg/liter)	0.2	Below detectable limit
pH	5.0–9.0	7.0–8.5

* In August, a minute amount of cyan was found in a surface treatment line because of a temporary shortage of water, which caused an excessive amount of cyanide to be detected in the swage drain pit. The shortage of water was resolved immediately, and liquid replacement intervals in the individual processes were modified. The measurements after the corrective actions have fallen below the voluntary limit, 0.05 mg/liter.

Yokogawa Fine Technology Corporation: Akiruno-shi, Tokyo, Japan (in industrial park)

■ Atmosphere

Substance	Facility	Legal Limit	Max. Measured Value
Hydrogen chloride (ppm)	Scrubber	25	4
Cyanide (ppm)	Scrubber	10	2
Trichloroethylene (mg/Nm^3)	Cleaning bath	500	210
Toluene, xylene (ppm)	Coating	200	58

■ Water Purity

Substance	Legal Limit	Max. Measured Value
Cyanide (mg/liter)	1	0.66
Hexahydric chromium (mg/liter)	0.5	0.05
Copper compounds (mg/liter)	3	1.7
Fluorine compounds (mg/liter)	15	2.6
All kinds of chromium compounds (mg/liter)	2	0.59
Trichloroethylene (mg/liter)	0.3	0.003
pH	5.8–8.6	6.8–8.2
Suspended solids (mg/liter)	50	14

Yokogawa Flowtech Co., Ltd.: Hisai-shi, Mie Pref., Japan (in industrial park)

■ Atmosphere

Substance	Facility	Legal Limit	Max. Measured Value
Nitrogen oxides (ppm)	Once-through boiler	130	33
Smoke and dust (g/Nm^3)	Once-through boiler	0.18	0.0028

■ Water Purity

Substance		Legal Limit	Max. Measured Value
Trichloroethylene (mg/liter)		0.3	Below detectable limit
pH		6.0–8.0	6.4–7.8
Biochemical oxygen demand (BOD) (mg/liter)		5	4.8
Suspended solids (mg/liter)		5	5
Normal-hexane extracts (mg/liter)	Mineral oil	1	Below detectable limit
	Animal/vegetable oil	10	Below detectable limit
Nitrogen (mg/liter)		120	25
Phosphorus (mg/liter)		16	2.1

Yokogawa Electronics Corporation: Haramachi-shi, Fukushima Pref., Japan (in industrial park)

■ Atmosphere

Substance	Facility	Legal Limit	Max. Measured Value
Nitrogen oxides (ppm)	Boiler	180	110
Smoke and dust (g/Nm^3)	Boiler	0.3	0.014

2. Handling of Toxic Substances - Implementation of Pollutant Release and Transfer Registers (PRTRs)

The use of chemicals is inevitable at work and in the home; however, some chemicals may cause pollution and influence the ecological system and human health. Since 1998, the Yokogawa Group has been controlling chemicals in line with the Pollutant Release and Transfer Registers (PRTRs).
The PRTR Law took effect in April 2001 in Japan following the world trend, and specifies 354 controlled chemicals. The Yokogawa Group is aggressively reducing the environmental impact of chemicals among these that it uses, such as prohibiting the use of some substances and reducing the amounts used of others. Among the Group's 12 Japanese domestic sites, 10 sites use PRTR-controlled chemicals; the total amounts used annually at these 10 sites are shown at the bottom.
Under the PRTR Law, each site that uses one ton or more of a controlled chemical (five tons or more during the first two years, as an interim measure) must report its releases and transfers to the government. A survey of the Yokogawa Group's domestic sites showed that more than one ton per year per site is used for the seven controlled chemicals shown in the table below. The Group is working hard to minimize the usage of these during the interim period.

Amounts of PRTR-controlled Chemicals Used

PRTR-controlled Chemical(s)	Total Amount Used at 10 Japanese Domestic Sites (tons)
Lead and lead compounds	13.4
Trichloroethylene	11.6
Toluene	10.6
Xylene	10.5
HCFCs	3.6
Dichloromethane	2.9
Cyanide	1.9

3. Environmental Risk Management

(1) Prevention of Soil and Subterranean Water Pollution

One key environmental risk is soil and subterranean water pollution from land that used to be the site of a factory. To address this issue, Yokogawa's Soil Research Criteria stipulate procedures for researching records on the use of substances which could affect the environment, operation records, and the soil itself. If a problem is found through such research, it must be reported to the corresponding municipal body and the soil must be restored to a clean state.

(2) Abstract of Research Results and Corresponding Actions

A study was performed according to the Soil Research Criteria for all Japanese domestic manufacturing plants that have ever used volatile organic compounds (VOCs) or heavy metals. The study revealed that the soil in part of the Headquarters has a heavy metal content higher than the reference value defined by the Environment Agency of Japan (now Ministry of the Environment). Accordingly, this was reported to the authorities, and countermeasures were taken in accordance with the “Guideline for Research and Countermeasures for Soil and Subterranean Water Pollution and Operation Standard” published by the Water Quality Preservation Bureau of the Environment Agency of Japan. A monitoring well was also dug and effects on the subterranean water were measured; fortunately, the subterranean water was found not to have been polluted, and so the local community was not at risk.
No problem was found in any of the other plants.

(3) Study on Demolishing Old Factories in Headquarters and Future Actions

A study of the land when tearing down old factories was conducted, and in the soils at some parts, VOC levels exceeding the soil environment standard were found, and the amounts of heavy metal leaching and content exceeding the respective reference values defined by the Environment Agency of Japan (now Ministry of the Environment) were also found. A monitoring well was therefore dug and the influence on the subterranean water was measured, which verified that the subterranean water had not been polluted. This was reported to the authorities, and the following actions were taken in accordance with the “Guideline for Research and Countermeasures for Soil and Subterranean Water Pollution and Operation Standard” published by the Water Quality Preservation Bureau of the Environment Agency of Japan and Yokogawa's purification program. The soil containing a heavy metal content exceeding the environment standard values was removed, then purified at a dedicated external facility. Any soil that contained a heavy metal content exceeding the reference value (defined by the Environment Agency of Japan) was covered by clean soil or encased in a concrete pit inside the Headquarter premises. As for VOCs, purification by soil gas suction is continuously being performed. The progress of purification measures and results of continuous monitoring of subterranean water will continue to be reported to the authorities.