The National Implementation Plan of Japan under the Stockholm Convention on Persistent Organic Pollutants

Modified in November 2020

The initial National Implementation Plan was endorsed by the “Council of Ministers for Global Environment Conversation” on 24 June 2005, and the revised plan was approved by the “Inter-Ministerial General Directors’ Meeting on the Stockholm Convention on Persistent Organic Pollutants” on 7 August 2012 and on 6 October 2016. The revision was made in accordance with Article 7 (Implementation plans) of the Stockholm Convention, the guidance in decision SC-1/12 (Annex, II 7) and the process shown in decision SC-2/7 (Annex, Step 7) of the Conference of the Parties, and this revised plan was endorsed by the “Inter-Ministerial General Directors’ Meeting on the Stockholm Convention on Persistent Organic Pollutants” on 20 November 2020.

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Chapter 1 Introduction

Article 7 of the Stockholm Convention on Persistent Organic Pollutants (hereafter referred to as the Stockholm Convention) requires each party to the Stockholm Convention to develop its national implementation plan (NIP) for implementation of its obligations under the Stockholm Convention and to transmit its NIP to the Conference of the Parties within two years of the date on which the Convention enters into force for the Party. Upon the addition of chemicals to the Annexes, each party is required to review and update the implementation plan in accordance with guidance of decision SC-1/2 (Annex, II 7) and process of decision SC-2/7(Annex, Step 7) of the Conference of the Parties. In addition, Article 5 of the Stockholm Convention requires each party to develop an action plan designed to reduce or eliminate releases from unintentional production of Persistent Organic Pollutants (hereafter referred to as POPs), and to subsequently implement it as a part of its NIP.

By international cooperation and through each party's concrete actions obliged under the Stockholm Convention based on its NIP, the reduction of POPs on global scale is expected to be promoted to realize the protection of human health and the environment.

The Convention prescribes that each party should implement the following measures.

- Measures to reduce or eliminate releases from intentional production and use
- Measures to reduce or eliminate releases from unintentional production (including the development and implementation of an action plan)
- Measures to reduce or eliminate releases from stockpiles and wastes containing POPs
- To develop and implement a national implementation plan for these measures
- Other measures
  - Measures to prevent the production and use of new POPs
  - Research and development, monitoring, provision of information to the public and education on POPs, etc.
  - Technical and financial assistance to developing countries

The NIP was revised to reflect the addition of decabromodiphenyl ether, short-chain chlorinated paraffins and hexachlorobutadiene to the Annexes at the Eighth Meeting of the Conference of the Parties held in April to May 2017, and its entry into force from 18 December 2018. This revision also includes dicofol and perfluorooctanoic acid (PFOA) and its salts, and PFOA-related substances, which were adopted to be listed in the Annex at the Nineth Meeting of the Conference of the Parties held in April to May 2019.

This document is a national implementation plan of Japan under Article 7 of the Stockholm Convention and includes an action plan and results of the assessment on

unintentional products under subparagraph (a) of Article 5 of the Convention.

This document was developed in reference to the draft guidance document for developing a national implementation plan for the Stockholm Convention, which was revised on January 2017.

Section 1 Background to the adoption of the Stockholm Convention and Japan's accession

POPs such as polychlorinated biphenyls (PCBs) and DDTs are toxic, persistent, bioaccumulative, and are transported through air, water and migratory species across international boundaries and deposited far from their location of emission and accumulate in terrestrial and aquatic ecosystems.

Therefore, it came to be internationally recognized that there are health concerns resulting from local exposure to POPs especially in developing countries, and in particular impacts upon women and through them, upon future generations, and that Arctic ecosystems and indigenous communities are particularly at risk because of the bioaccumulation of POPs through food chain, and the contamination of their traditional foods is a public health concern.

It was recognized that actions by only a limited number of countries are insufficient for the worldwide elimination and reduction of POPs. Therefore, negotiations within a multilateral framework were initiated in 1998 to draft an international convention on the elimination and reduction of POPs. In the wake of discussions and negotiations at 2 meetings of the Expert Group to define the criteria of POPs and 5 meetings of the Inter-Governmental Negotiating Committee, the Stockholm Convention was adopted at the Conference of Plenipotentiaries held in Stockholm in May 2001.

The Japanese government has positively participated in the work to establish a legally binding international framework since the first Inter-Governmental Negotiating Committee. The Japanese government acceded to the Convention on 30 August 2002.

On 17 February 2004, the fiftieth instrument of ratification, acceptance, approval or accession to become a Party to the Stockholm Convention was submitted and the Stockholm Convention entered into force on 17 May 2004. As of July 2020, 182 countries including Japan, the European Union (EU), and State of Palestine are the contracting parties to the Convention.

Section 2 Historical Background of POPs issues in Japan

In the past, crops, water and soil contaminated with high residue level of agricultural chemicals such as DDTs, aldrin and dieldrin used in Japan led to social problems. Hence, the "Agricultural Chemicals Regulation Act (Act No. 82 of 1948)" was amended in 1971, and then the evaluation system for the residues in crops, water and soil and the toxicity was introduced on agricultural chemicals registration. Thus, in addition to the protection measures for aquatic organisms, a new regulation was introduced whereby the registration of agricultural chemicals is withheld if they may cause human health and livestock adverse effect through residues in crops or soil or through water pollution. However, dieldrin and chlordane were also used as insecticides for termite control raising concerns for environmental pollution.

In 1980s, the use of these chemicals for non-agricultural purposes were regulated by prior authorization for their production and import (practically prohibited) and the restriction and notification for their use (practically prohibited), under the Law concerning the Evaluation of Chemical Substances and Regulation of Their Manufacture etc. (Law No. 117 of 1973, hereafter referred to as the Chemical Substances Control Law)

PCBs, which possess chemical stability, insular characteristics and incombustibility, have been used for a wide range of purposes including electrical insulation oil and heating medium for transformers and capacitors. However, ever since 1966, it has become increasingly apparent that PCBs contaminate the environment as exemplified in the PCBs detected in fish and birds worldwide. In Japan, in 1968, the PCBs used as heating medium in the manufacturing process of cooking oil had contaminated the product and caused health hazards (the Kanemi Cooking Oil Health Hazards Incident). Subsequently, PCBs were detected in various organisms and breast milk and PCBs contamination became a major social issue. Given this situation, the production of PCBs ceased since 1972 and the Chemical Substances Control Law was enacted in 1973. Under the law, a framework was created to evaluate chemical substances like PCBs in advance, which resist degradation in the environment (persistent), bioaccumulate in the bodies of living organisms (bioaccumulative) and are likely to be hazardous to the health of human beings in cases of continuous intake, and to regulate production, import and use of chemicals to prevent the environment from being contaminated by such chemical substances. The Chemical Substances Control Law was amended in 2003, to bring within its regulation chemical substances which are likely to cause damages to top predators in the ecosystem, in addition to chemical substances which are persistent, bioaccumulative and may be hazardous to the health of human beings in cases of continuous intake.

Moreover, there were several moves to establish PCB disposal facilities under the initiative of the private sector in order to dispose of PCBs already produced. However, such

moves failed to ensure understanding and consent from local communities, and much of the PCBs remained as stockpiles without being disposed of over nearly 30 years. It was also found that during the long term stockpiling, some transformers were lost or became untraceable and there were concerns that such stockpiled PCBs might contaminate the environment. Thus, in June 2001, the Law concerning Special Measures for Promotion of Proper Treatment of PCB Wastes (Law No.65 of 2001, hereafter referred to as the PCB Special Measures Law) was enacted to obligate entities possessing PCB wastes to report the status of their stockpiling and to dispose of such waste within a given timeframe in an environmentally sound manner, in order to facilitate the sure and correct treatment of PCB wastes.

The environmental issues related to dioxins (polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and coplanar PCBs) attracted public attention in 1983 when investigations revealed that dioxins were detected in the fly ashes from municipal waste incinerators. Therefore, measures to monitor dioxins in the bottom sediment, rivers, lakes, sea waters and aquatic organisms was initiated in 1985, and in the ambient air in 1986. Investigations were implemented on the actual status of waste incinerators in 1984 and pulp and paper factories in 1990. On the basis of the findings from these investigations, guidelines were established and administrative guidance on controlling emissions was conducted.

Furthermore from around 1996 onward, public concern heightened on environmental contamination caused by releases from waste incinerator facilities. In 1997 dioxins were designated as hazardous air pollutants and measures were introduced to control their emission into the atmosphere in terms of the preventive actions taken to reduce risks of health hazards under the Air Pollution Control Law (Law No.97 of 1968). Furthermore, in July 1999, the Law concerning Special Measures against Dioxins (Law No.105 of 1999, hereafter referred to as the Dioxins Law) was established and the regulatory framework was put in place to implement comprehensive measures such as establishing the tolerable daily intake and environmental quality standards, regulating the release of emission gases and effluent water from various facilities, introducing enhanced regulation on waste disposal and conducting investigations on the status of contamination and taking measures against contaminated soil and other matters. Now these measures are implemented under the Law.

Section 3 Procedures for the development and revision of the national implementation plan

In January 2003, Inter-Ministerial General Directors' Meeting on the Stockholm

Convention on Persistent Organic Pollutants and its Steering Committee were established and these started their work for developing the NIP.

After the Inter-Ministerial Meeting had developed the draft NIP document in May 2005, the Inter-Ministerial Meeting published the draft NIP document for comments from the general public for 2 weeks. Afterwards, the NIP was amended by the Inter-Ministerial Meeting and submitted to the Council of Ministers for Global Environment Conversation for its endorsement on 24 June 2005.

At the Fourth Meeting of the Conference of the Parties, amendments were made to list nine new chemicals to the Annexes, and the amendments of the Annexes came into force on August 2010. Hence, with the cooperation of relevant ministries, the modification of the 2005 NIP started in 2011 and the revised NIP was drafted and published in June 2012 by the Inter-Ministerial Meeting for a 30-day public commenting period. After further revisions, the Plan was adopted as the revised NIP at the Inter-Ministerial General Directors' Meeting of 7 August 2012. This revised NIP included the new chemical added at the Fifth Meeting of the Conference of the Parties.

At the Sixth Meeting of the Conference of the Parties, a new chemical was adopted to be added to the Annex, and the amendment of the Annex came into force on November 2014. In response to this, the revision of the 2012 NIP was started with the cooperation of relevant ministries, and the revised NIP was drafted and published in June 2016 by the Steering Committee of Inter-Ministerial General Directors' Meeting for a 30-day public commenting period. After further considerations, the Plan was adopted as the revised NIP at the Inter-Ministerial General Directors' Meeting of 6 October 2016. This revised NIP included the three new chemical groups which were added at the Seventh Meeting of the Conference of the Parties.

In addition, at the Eighth Meeting of the Conference of the Parties, three new chemicals were adopted to be added to the Annexes, and the amendment of the Annexes came into force on December 2018. In response to this, the revision of the 2016 NIP was started with the cooperation of relevant ministries, and the revised NIP was drafted by the Steering Committee of Inter-Ministerial General Directors' Meeting in July 2020 and published for a 30-day public commenting period. After further considerations, the Plan was adopted as the revised NIP at the Inter-Ministerial meeting of 20 November 2020**.** This current revised NIP includes the two new chemical groups which were added at the Nineth Meeting of the Conference of the Parties.

Chapter 2 The current status of Japan

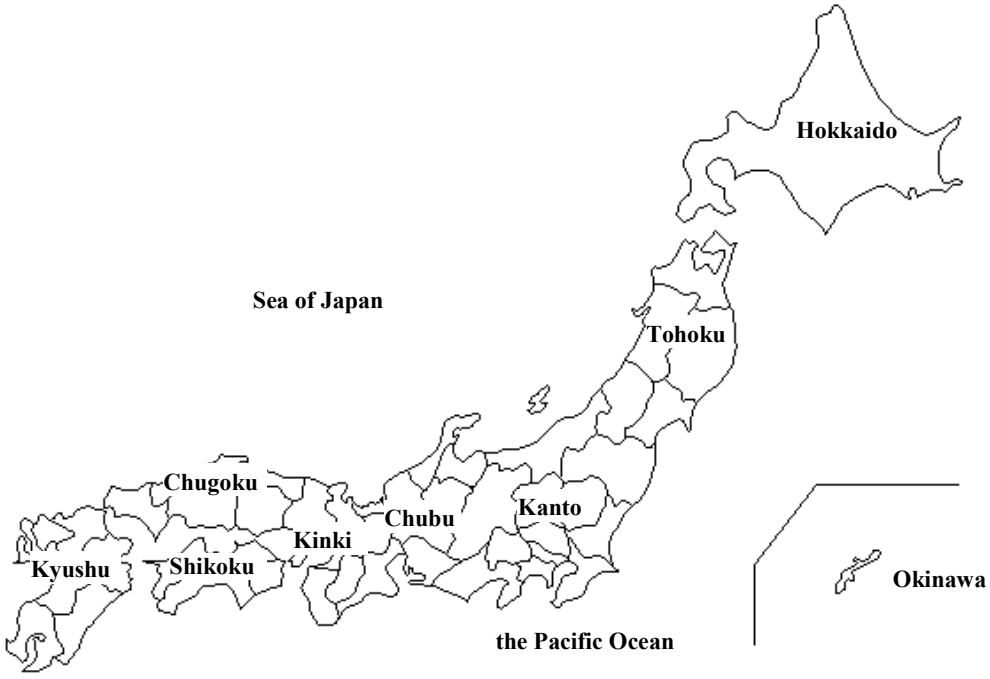
Section 1 Country profile

1. Population and other statistics

(1) Geography

The area of Japan is approximately 378,000 km^2. And it is situated to the east of the Asian Continent. Japan consists of four major islands (Honshu, Hokkaido, Kyushu and Shikoku in the diminishing order of the size of area) and has many other smaller islands. Japan faces the Pacific Ocean on the eastern side, and the Sea of Japan and the East China Sea between Japan and the Asian Continent.

Diagram: Japanese map



(Source: Web-japan homepage [Ministry of Foreign Affairs] http://web-japan.org/factsheet/)

(2) Official language and educational system

Japan's official language is Japanese, and literacy rate is almost 100%. Six years of elementary school and three years of junior high school are compulsory, and 98.8% of students graduating junior high school go to high school and other institutions (as of 2019). 58.1% of students enroll in higher education institutions (universities (undergraduate course) and junior colleges), including the number of students attending preparatory schools for university (as of 2019).

(3) Population dynamics

The total population of Japan is approximately 127.09 million (as of 2015).

Table: Total population and age composition

Year	Population (unit: 1,000 persons)				Proportion (%)		
	Total number	Age 0-14	Age 15-64	Age 65 and over	Age 0-14	Age 15-64	Age 65 and over
1920	55,963	20,416	32,605	2,941	36.5	58.3	5.3
1925	59,737	21,924	34,792	3,021	36.7	58.2	5.1
1930	64,450	23,579	37,807	3,064	36.6	58.7	4.8
1935	69,254	25,545	40,484	3,225	36.9	58.5	4.7
1950	84,115	29,786	50,168	4,155	35.4	59.6	4.9
1955	90,077	30,123	55,167	4,786	33.4	61.2	5.3
1960	94,302	28,434	60,469	5,398	30.2	64.1	5.7
1965	99,209	25,529	67,444	6,236	25.7	68.0	6.3
1970	104,665	25,153	72,119	7,393	24.0	68.9	7.1
1975	111,940	27,221	75,807	8,865	24.3	67.7	7.9
1980	117,060	27,507	78,835	10,647	23.5	67.3	9.1
1985	121,049	26,033	82,506	12,468	21.5	68.2	10.3
1990	123,611	22,486	85,904	14,895	18.2	69.5	12.0
1995	125,570	20,014	87,165	18,261	15.9	69.4	14.5
2000	126,926	18,472	86,220	22,005	14.6	67.9	17.3
2005	127,768	17,521	84,092	25,672	13.8	66.1	20.2
2010	128,057	16,803	81,032	29,246	13.2	63.8	23.0
2015	127,095	15,887	76,289	33,465	12.6	60.7	26.6

Source: Report on National Census, Statistics Bureau, Ministry of Internal Affairs and Communications
Notes: Persons whose ages are unknown have been included in the total numbers since 1975.

(4) Average life expectancy

In 2019, the average life expectancy is 81.41 years for men and 87.45 years for women.

(5) Population of 15 years old or more and unemployment rate

According to the Labour Force Survey in 2019, the population above and including

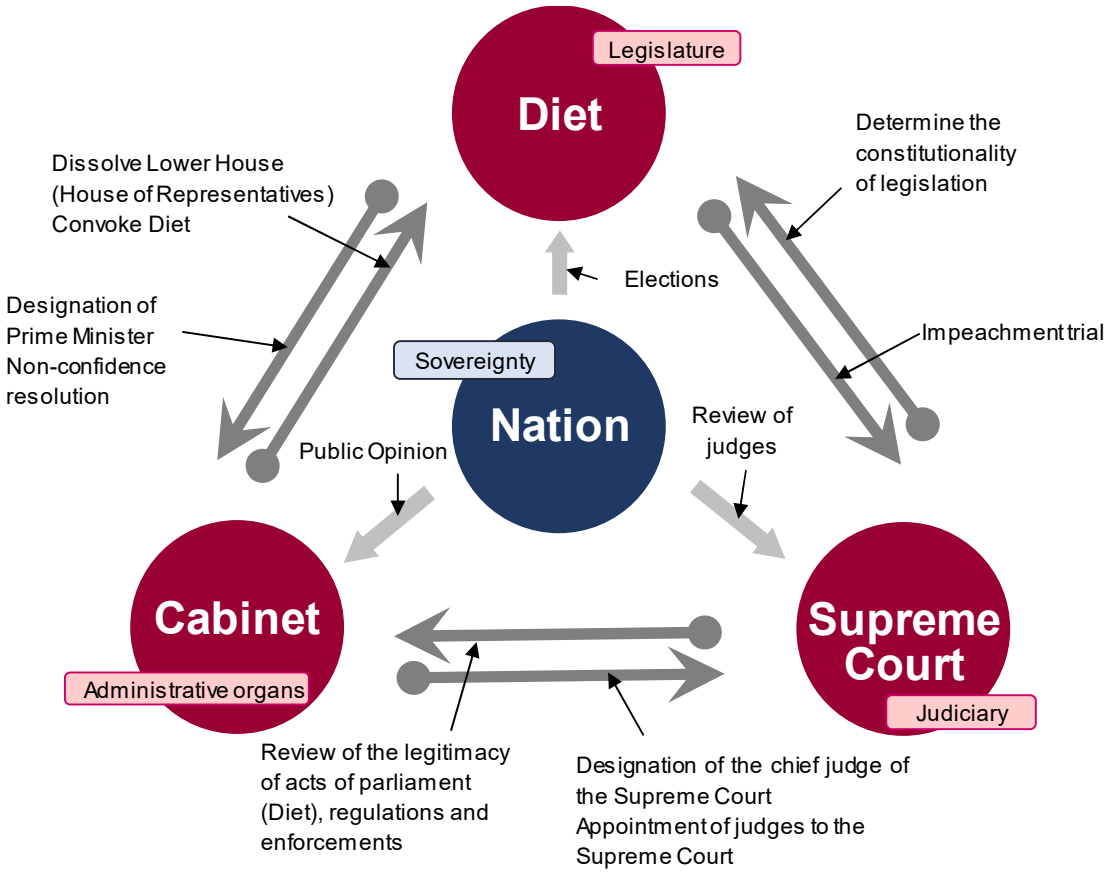
age 15 is 110.92 million. The unemployment rate is 2.4%.

2. Political structure

(1) Form of government

The present Constitution came into effect on 3 May 1947. The Cabinet Law came into effect at the same time, and with it the present cabinet system was established. In other words, under the sovereignty of the nation the separation of the three powers of the Executive, the Legislature and the Judiciary is ensured thoroughly, and at the same time, under the basic framework of a two-house parliamentary cabinet system, the Cabinet was given the status of the main body of executive authority.

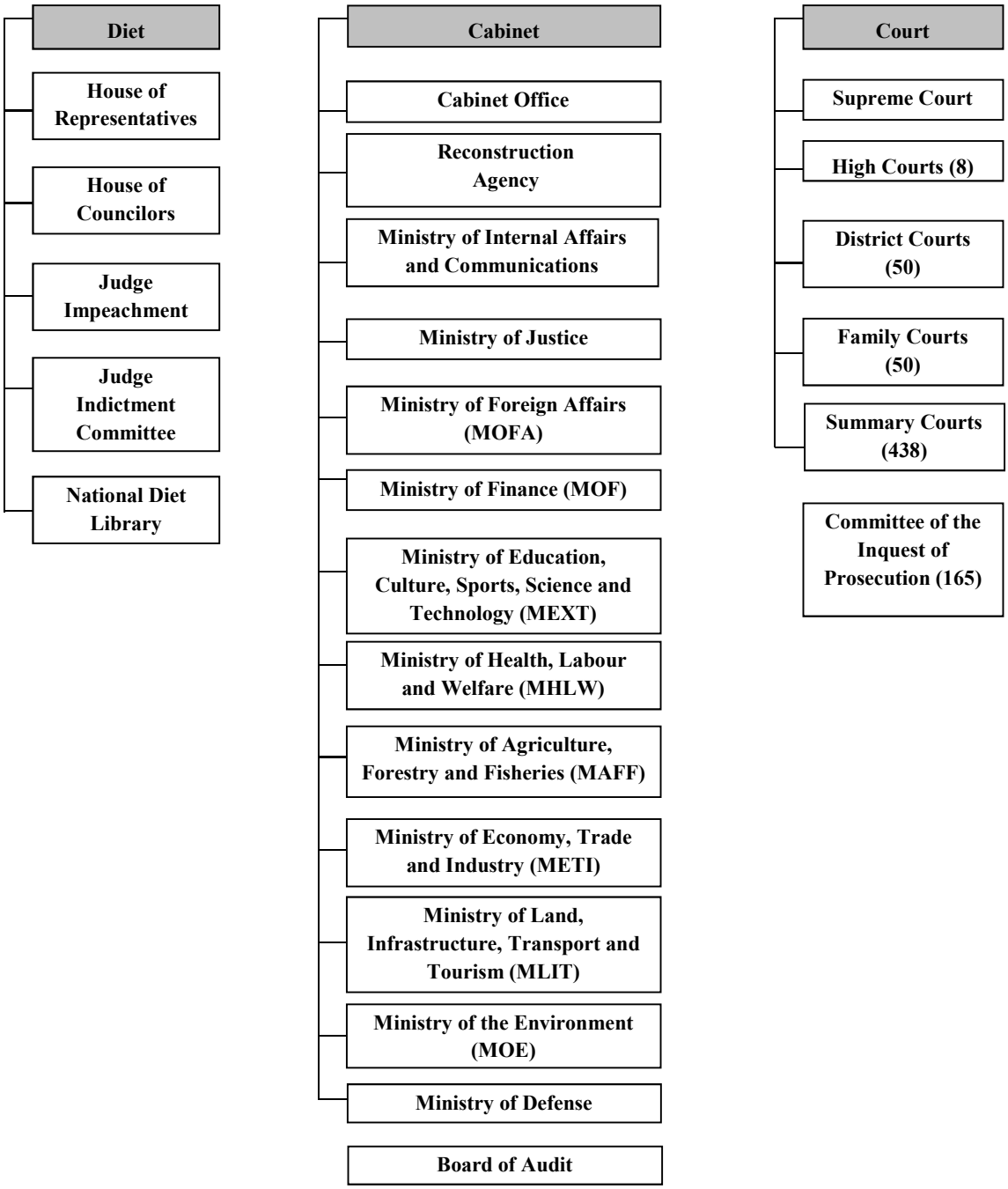
Diagram: The separation of the three powers under the Japanese Constitution



The Prime Minister is given the position of Head of the Cabinet and represents the Cabinet. Furthermore, under the Constitution, executive power is vested in the Cabinet. The

Cabinet Office and 11 ministries established under the Cabinet exercise administration. Furthermore, committees and agencies are established as external bureau of the Cabinet Office.

Diagram: Structure of the Legislature (Diet), the Executive and the Judiciary



Source: Homepage of Cabinet Secretariat
(https://www.cas.go.jp/jp/gaiyou/jimu/jinjikyoku/2017_pdf/01_2017organizationcharts.pdf)

(2) The number of local public authorities

There are 47 prefectures, 792 cities, 743 towns and 183 villages in Japan (as of October 2020). 60 cities have been designated as major urban cities (as of April 2020)

Source: Homepage of the Ministry of Internal Affairs and Communications
(https://www.soumu.go.jp/kouiki/kouiki.html, http://www.soumu.go.jp/cyukaku/index.html)

(3) The status of local public authorities and decentralization

The fundamental principle of local autonomy is set in the Local Autonomy Law (Law No. 67 of 1947). This law specifies the formal and organizational framework of local public authorities, and matters regarding their administration. Furthermore, this law stipulates the fundamental relations between the government and local public authorities.

3. The manufacturing and agricultural sectors

(1) Table: Overview of the manufacturing and agricultural sectors

Sector	(1) Contribution rate to Gross Domestic Product (unit: billion yen)(as of 2017)	(2) Number of employees (thousand persons)(as of 2016)
Manufacturing	112,988 (20.7%)	8,864 (15.5%)
Mining	301 (0.1%)	19 (0.03%)
Agriculture, forestry and fisheries	6,482 (1.2%)	363 (0.6%)
Total	119,772 (22.0%)	9,246 (16.2%)

Source: (1) *Annual National Accounts,* Cabinet Office, (2) *2016 Economic Census for Business Activity*, Statistics Bureau, Ministry of Internal Affairs and Communications
Note: The definitions of manufacturing and agricultural sectors in each of the statistics vary.

(2) Table: The structure of the manufacturing and agricultural sectors

Sector	Micro Business	Small-Scale Business	Medium-Scale Business	Large-Scale Business
Manufacturing	481,779 (86.4%)	62,112 (11.1%)	10,284 (1.8%)	3,249 (0.6%)
Agriculture, forestry and fisheries	41,107 (93.6%)	2,701 (6.1%)	112 (0.3%)	4 (0.01%)
Total of all sectors	5,743,636 (91.4%)	478,260 (7.6%)	49,949 (0.8%)	12,961 (0.2%)

Source: *2014 Economic Census for Business Frame*, Statistics Bureau, Ministry of Internal

Affairs and Communications
Note: Micro businesses are defined here as holding between 1 and 19 employees, small-scale businesses between 20 and 99 employees, medium-scale businesses between 100 and 299 employees, and large-scale businesses more than 300 employees.

4. Employment in the major economic sectors

Table: Employment situation in major types of industry

Type of Industry	Number of Businesses (Establishments)	Number of Employees
Forestry	3,209	41,980
Metal mining	6	213
Coal and lignite mining	17	581
Crude petroleum and natural gas	25	784
Food	48,999	1,291,141
Beverages, tobacco and feed	8,513	139,383
Textile mill products	40,058	366,661
Lumber and wood products except furniture	13,723	123,150
Furniture and fixtures	21,548	141,052
Pulp, paper and paper products	11,161	214,678
Chemicals and related products	8,836	431,410
Petroleum and coal products	1,705	3,2054
Plastic products	23,349	469,221
Leather tanning, leather products and fur skins	5,057	35,066
Ceramic, stone and clay products	21,232	286,913
Iron and steel	8,815	241,817
Non-ferrous metals and products	5,387	146,752
Fabricated metal products	59,560	710,434
General purpose machinery	14,715	360,566
Production machinery	40,566	656,083
Business oriented machinery	9,267	250,831
Electrical machinery, equipment and supplies	16,994	537,514
Transportation equipment	19,834	1,104,087
Electricity	2,114	125,882
Gas	521	33,726
Heat supply	208	1,984
Water	1,801	26,085
Waste treatment services	20,005	271,749

Source: *2016 Economic Census for Business Activity*, Statistics Bureau, Ministry of Internal Affairs and Communications

Section 2 Implementation status of measures regarding POPs

1. Regulation of production, use, import and export

Production, use, import and export of the chemicals designated under the Stockholm Convention are prohibited or virtually prohibited under the Chemical Substances Control Law, the Agricultural Chemicals Regulation Act, the Act on Securing Quality, Efficacy and Safety of Products Including Pharmaceuticals and Medical Devices (Act No. 145 of 1960, hereafter referred to as the Pharmaceuticals and Medical Devices Act), the Export Trade Control Order (Cabinet Order No. 378 of 1949) and the Import Trade Control Order (Cabinet Order No. 414 of 1949) based on the Foreign Exchange and Foreign Trade Act (Act No. 228 of 1949). These measures will be described for detail in Section 3 of Chapter 3.

2. Measures regarding unintentional production

In Japan, under the Dioxins Law, PCDDs, PCDFs and coplanar PCBs are defined as the dioxins. Environmental quality standards, tolerable daily intake (TDI) and emissions standards for effluent water and emission gases from specified facilities are set forth. A government plan to reduce the release of dioxins is established, and various release reduction measures are promoted in a comprehensive manner.

According to the current scientific knowledge, the source categories and the formation processes of PCBs, hexachlorobenzene (HCB) and polychlorinated naphthalenes (PCNs) are considered to be similar to those of dioxins. Therefore, it is assumed that the release of PCBs, HCB and PCNs have also been reduced through the dioxins reduction measures.

Under the Law concerning Reporting etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (Law No.86 of 1999, hereafter referred to as the PRTR Law) dioxins and PCBs are subject to the requirements of the PRTR (Pollutants Release and Transfer Register) system.

3. Measures regarding stockpiles and wastes

(1) Collection and detoxification of POPs agricultural chemicals

Under the Agricultural Chemicals Regulation Act, the distribution or use of agricultural chemicals containing 17 chemicals listed under the Stockholm Convention as the active ingredient is prohibited. Additionally, manufacturers and the like have collected these agricultural chemicals and have either stored them safely or detoxified them.

In Japan, organochlorine agricultural chemicals including certain POPs (aldrin, dieldrin, endrin, DDTs and BHC (α-hexachlorocyclohexane, β-hexachlorocyclohexane and lindane), hereafter referred to as POPs agricultural chemicals) used to be stored in the ground. According to a survey done by the Ministry of Agriculture, Forestry and Fisheries, the total amount of stored POPs agricultural chemicals and the number of the stored places identified were 4,400 tons and 168 places, respectively. Approximately 4,100 tons of these POPs agricultural chemicals were already excavated and handled properly by March 2019.

(2) Consideration on proper disposal of POPs wastes

Stored POPs agricultural chemicals and ashes from incineration plants containing dioxins mentioned above must be disposed of appropriately as wastes containing POPs. Wastes containing dioxins are properly treated based on the Dioxins Law and the Waste Management and Public Cleansing Law (Law No.137 of 1970, hereafter referred to as the Waste Management Law). Wastes containing PCBs are treated based on the PCB Special Measures Law. To promote safe and definite detoxification, collection and transport of waste electrical equipments contaminated with small amount of PCBs, the following guidelines have been issued: “Guideline for treatment of low level PCB contaminated wastes - incineration (Revised December 2019),” “Guideline for treatment of waste electronical equipments contaminated by small amount of PCBs - cleansing (Issued September 2019)” and “Guideline for collecting and transporting low level PCB wastes (Issued December 2019).”

To promote appropriate treatment of other POPs wastes, “Technical Guidance on Treatment of Agricultural Chemicals containing POPs (Revised August 2009)” and “Technical Guidance on Treatment of Wastes containing PFOS (Revised March 2011)” were prepared based on the outcomes of the above mentioned development of detoxification methods for POPs agricultural chemicals and wastes containing perfluorooctane sulfonic acid (PFOS) or its salts. Necessary measures for other POPs wastes are also being considered to promote appropriate treatment of these wastes.

4. Environmental monitoring

In Japan, environmental monitoring on a continuous basis was initiated from 1978 with respect to wildlife and from 1986 with respect to water and bottom sediment to understand and monitor long term trends of persistence of chemical substances in the environment. The measurement has been conducted, in principle, using the same sampling and analytical methods with occasional minor adjustments as necessary. Monitoring of POPs was added in 2002 to the Environmental Survey and Monitoring of Chemicals as a new monitoring survey. This survey

aims to monitor the quantity of POPs in Japan and verify the effectiveness of the measures for eliminating and reducing their emission.

The nationwide monitoring of dioxins started in 1985 with respect to bottom sediment, rivers, lakes, sea waters and aquatic organisms and in 1986 with respect to the ambient air. In 1998, water and soil also became subject to nationwide monitoring of dioxins. Furthermore, since 2000, local public authorities have been implementing a larger scale monitoring program as the continuous monitoring program under the Dioxins Law.

The local public authorities monitor PCBs in the rivers, lakes, reservoirs and sea waters as part of the continuous monitoring program for public water quality under the Water Pollution Prevention Act (Act No.138 of 1970).

Section 3 Current situations and problems surrounding POPs

1. Status of general environment

This section outlines the annual trends of concentration of 26 POPs in each environmental medium in Japan and the current situation surrounding POPs. These are based on the results of environmental monitoring conducted up to FY2018. The section also briefly addresses the monitoring results of POPs chemicals which were adopted to be listed in the Annexes of the Stockholm Convention at the Nineth Meeting of the Conference of the Parties (dicofol and perfluorooctanoic acid (PFOA)). Inter-annual trends are based on the results of surveys conducted after the introduction of a new high-sensitive analytical methods in FY2002 which significantly improved the detection limit(see Table 1 to 3 of the Appendix for the past activities in environmental monitoring and current analytical methods used.).

(1) Dioxins

(i) Air

The government started surveys on ambient air in FY1986. Since FY1997, it has conducted annual surveys under the Air Pollution Control Law. Since FY2000, local public authorities have been conducting such surveys on a large scale as the regular observation under the Dioxins Law.

Regarding FY2018 surveys;

- A total of 1,817 specimens from 676 sites across the country were surveyed. In the 619 sites which satisfy the evaluation criteria of the environmental quality standard (0.6 pg-TEQ/m^3, measurement conducted more than twice throughout the year,

including summer and winter seasons), the annual average of dioxins concentration was 0.018 pg-TEQ/m^3, in the range of 0.0032 to 0.17 pg-TEQ/m^3 (see Table 4 of the Appendix). Of these sites, no site exceeded the environmental quality standard for ambient air (excess rate of 0.0 %).

- Surveys for the PCDDs/PCDFs concentration had been continued at 24 sites. The average concentration of PCDDs/PCDFs at these sites was substantially declining to 0.019 pg-TEQ/m^3, compared with 0.64 pg-TEQ/m^3 in FY1997.

(ii) Public waters

The government started surveys on the quality of public waters in FY1998. Since FY2000, local public authorities have been conducting such surveys on a large scale as regular observation under the Dioxins Law.

Regarding FY2018 surveys;

- A total of 1,431 sites across the country showed average dioxins concentration of 0.18 pg-TEQ/L in the range of 0.0084 to 4.1 pg-TEQ/L (see Table 4 of the Appendix). Of these sites, 17 sites (15 sites in rivers and two sites in lakes) exceeded the environmental quality standard for water of annual average of 1 pg-TEQ/L or less (excess rate of 1.2%).
- Surveys were continued at 616 sites. The average concentration of dioxins at these sites has been declining to 0.20 pg-TEQ/L, compared with 0.39 pg-TEQ/L in FY2000.

(iii) Bottom sediment in public waters

The government started surveys on bottom sediment in public waters in FY1985. Since FY2000, local public authorities have been conducting such surveys on a large scale as the regular observation under the Dioxins Law.

Regarding FY2018 surveys;

- A total of 1,187 sites across the country showed average dioxins concentration of 5.9 pg-TEQ/g-dry in the range of 0.0083 to 430 pg-TEQ/g-dry (see Table 4 of the Appendix). Of these sites, three sites in rivers exceeded the environmental quality standard for bottom sediment of 150 pg-TEQ/g or less (excess rate of 0.3%).
- Surveys were continued at 393 sites. The average concentration of dioxins at these sites has been declining to 8.9 pg-TEQ/g-dry, compared with 19 pg-TEQ/g-dry in FY2000.

(iv) Groundwater

The government started surveys on groundwater in FY1998. Since FY2000, local

public authorities have been conducting such surveys on a large scale as the regular observation under the Dioxins Law.

Regarding FY2018 surveys;

- A total of 511 sites across the country showed average dioxins concentration of 0.044 pg-TEQ/L in the range of 0.0072 to 0.36 pg-TEQ/L (see Table 4 of the Appendix). All sites met the environmental standard for water of annual average of 1 pg-TEQ/L or less.

(v) Soil

The government started surveys on soil in FY1998. Since FY2000, local public authorities have been conducting such surveys on a large scale as the regular observation under the Dioxins Law.

Regarding FY2018 surveys;

- A total of 818 sites across the country showed average dioxins concentration of 2.5 pg-TEQ/g-dry in the range of 0 to 150 pg-TEQ/g-dry (see Table 4 of the Appendix). Of these sites, no site exceeded the environmental quality standard for soil of 1,000 pg-TEQ/g-dry or less (excess rate of 0.0%).
- An average dioxins concentration at 559 sites, targeted in a general environmental survey, was 1.4 pg-TEQ/g-dry in the range of 0 to 30 pg-TEQ/g-dry. An average dioxins concentration at 259 sites, targeted in a survey on areas surrounding sources was 4.7 pg-TEQ/g-dry in the range of 0 to 150 pg-TEQ/g-dry.

(vi) Aquatic organisms

The government implemented surveys on aquatic organisms from FY1985 to FY1999.

Regarding FY1999 surveys;

- A total of 2,832 specimens of fish, crustaceans and shellfish from 543 sites showed average dioxins concentration of 1.4 pg-TEQ/g-wet in the range of 0.032 to 33 pg-TEQ/g-wet. The average concentration was slightly lower and the concentration range remained at almost same level, compared with the results in FY1998 (average of 2.1pg-TEQ/g-wet and a range of 0.0022 to 30 pg-TEQ/g-wet).

(vii) Wild mammals/birds

The government implemented surveys on wildlife from FY1997 to FY2007. (In FY2007, study was carried out on the following four species: the great cormorant, the finless porpoise, the large Japanese field mouse and the raccoon dog, totaling 41 specimens.)

- Accumulated concentrations remained at the same level compared with the past

surveys.

- The surveys insisted that although the amount of environmentally released dioxins had decreased by the measures taken at the emission source, its effect is limited or will take time for the accumulated concentration in wildlife.

(viii) Human

The government started surveys on human in FY2002. Since FY2011, a more efficient monitoring study has been conducted concerning the chemicals in the human body. To determine the bioaccumulation in human bodies and the exposure concentrations, measurements of concentrations in blood and diet have been carried out in three different areas.

Regarding FY2016 surveys;

- The average dioxins concentration in blood for 80 people was 10 pg-TEQ/g-fat, and the concentrations were in the range of 0.92 to 29 pg-TEQ/g-fat. This level is comparable with the results in FY2012 and FY2013, and lower than the surveys before that.

(2) Polychlorinated biphenyls (PCBs)

The government continuously monitored PCBs in wildlife from FY1978 to FY2001. As for air, water and sediments, a highly sensitive analytical method has been used since FY2000, and a descriptive analysis had been done for congeners and coplanar PCBs. Using this method, the government has been monitoring the concentration levels in wildlife, air, water and sediments annually with its monitoring survey since FY2002.

(i) Wildlife

- Especially in Tokyo Bay, Osaka Bay and Offshore of Himeji, which are semi-closed water areas and located close to densely populated districts, the PCB concentration in sea bass is relatively high, compared with specimens in other areas. The figure seems to be fluctuating in these three water areas between tens and hundreds of ng/g-wet. Thus it is difficult to identify a clear trend(see Figure 1 of the Appendix).
- For bivalves, the PCB concentrations in blue mussel in Yamada Bay and coast of Noto Peninsula have stayed stable below 10 ng/g-wet. (see Figure 2 of the Appendix).
- Statistically significant decreasing trend was observed through FY2002 to FY2018 for bivalves. Meanwhile, no significant trend was observed for fish. Regarding the FY2018 survey, PCBs were detected in all three sites for bivalves, 18 sites for fish and two sites for birds. The ranges of total PCB concentration were from 0.74 to 12 ng/g-wet, from 1.2 to 28 ng/g-wet, from 85 to 130 ng/g-wet for bivalves, fish and birds,

respectively.

(ii) Air

- Statistically significant decrease of PCB concentration for warm season was observed through FY2003 to FY2018.
- Regarding the FY2018 surveys, PCBs were detected in all 37 sites within the total concentration range of 20 to 750 pg/m^3.

(iii) Water

- Statistically significant decreases of PCB concentrations in rivers, lakes and estuaries were observed through FY2002 to FY2018. Reduction tendency in specimens from overall areas was also identified as statistically significant.
- Regarding FY2018 surveys, PCBs were detected in all 47 sites, and the total concentration in water varied from tr(11) to 2,600 pg/L. The PCB concentration exceeded 1,000 pg/L in several ports and estuaries near large cities, such as Tokyo Bay and Osaka Bay (see Table 5 of the Appendix). As for the composition of congeners, the major congeners were PCBs with three or four chlorines (see Figure 3 of the Appendix).

(iv) Sediment

- Statistically significant decrease was observed through FY2002 to FY2018 for rivers and sea area. Reduction tendency in specimens from the overall areas was also identified as statistically significant.
- Regarding FY2018 surveys, PCBs were detected in in 58 out of 61 sites and the total concentration in bottom sediment varied from ND (not detected, i.e. less than the detectable limit) to 720,000 pg/g-dry (detection limit: 55 pg/g-dry). The PCB level was especially high in Osaka Port. In Keihin Canal (Port of Kawasaki), mouth of River Sumida, Yokohama Port, Toba Port, Mouma-bashi Bridge on River Oh-kawa (Osaka City), Kobe Port, and Dokai Bay PCBs were detected over one hundred thousand pg/g-dry (see Table 6 of the Appendix).

The environmental quality standard for water and soil requires that PCBs should not be detected by the gas chromatography method at the quantification limit of 0.0005 mg/L. The FY2018 survey on public waters and groundwater ascertained that all measuring sites meet the standard (see Table 7 of the Appendix).

(3) Hexachlorobenzene (HCB)

The government has monitored the HCB concentration in wildlife from 1978 to 2001, excluding 1997 and 1999. The HCB concentration in air was first measured in 1999 in the Survey on Development of an Analytic Method for Chemicals and then in the Environmental Survey on Endocrine Disruptors. As for HCB concentration in water and sediment, the government has implemented monitoring surveys from 1986 to 1998 and from 1986 to 2001, respectively. A high-sensitive analytical method was introduced in FY2002, and the HCB concentration levels in wildlife, air, water and sediment are monitored annually.

(i) Wildlife

- No significant trend was observed through FY2002 to FY2018 for the bivalves and fish surveys.
- HCB has been detected in nearly all sites since FY2002. Regarding FY2018 surveys, HCB concentrations ranged from 14 to 28 pg/g-wet, 25 to 900 pg/g-wet and 2,600 to 3,100 pg/g-wet for bivalves, fish and birds, respectively. HCB was detected in all three sites for bivalves, 18 sites for fish and two sites for birds.

(ii) Air

- No significant trend was observed through FY2002 to FY2018.
- Regarding FY2018 surveys, HCB was detected in all 37 sites and concentration in air ranged from 72 to 140 pg/m^3 (warm season).

(iii) Water

- Statistical analysis from FY2002 to FY2018 indicated decreasing trends in rivers and estuaries. In sea area, results obtained during the last six years of the study were considered lower than the ones obtained during the first six years of the study. Reduction tendency in specimens from overall areas was also identified as statistically significant. Regarding FY2018 surveys, HCB was detected in all 47 sites, and concentration in water ranged from 4.0 to 380 pg/L.

(iv) Sediments

- Statistically significant decrease of HCB concentration in rivers was observed through FY2002 to FY2018. Reduction tendency in sediment from overall areas was also identified as statistically significant.
- Regarding FY2018 surveys, HCB was detected in all 61 sites with a concentration range of 3.1 to 8,900 pg/g-dry.

(4) Aldrin, dieldrin and endrin

The government had monitored aldrin and endrin in biological specimens annually from FY1978 to FY1989, and then on FY1991 and FY1993. The monitoring of dieldrin in wildlife was conducted annually from FY1978 to FY2001 (except in FY1997 and FY1999). Annual surveys using a high-sensitive method were conducted from FY2002 to FY2009 on wildlife, air, water and sediment.

Although drins were once used within the country, the environmental concentrations stayed constant over the years. Thus, with increasing numbers of chemicals listed in the Stockholm Convention, the frequencies of governmental surveys were reviewed and drins were decided to be monitored less frequently after FY2009.

For aldrin, dieldrin and endrin in sediment, the results obtained in FY2018 are presented below. Since no survey was conducted after FY2015 for aldrin, dieldrin and endrin in wildlife, air and water, only the results obtained before the FY2014 surveys are summarized below.

(i) Wildlife

- No significant trend was observed through FY2002 to FY2014 for aldrin, dieldrin and endrin.
- Dieldrin has been detected in all sites since FY2002. Regarding FY2014 surveys, dieldrin was detected in all three sites for bivalves, 19 sites for fish and two sites for birds, with concentrations ranging from 41 to 490 pg/g-wet, 27 to 1,000 pg/g-wet, and 190 to 530 pg/g-wet for bivalves, fish and birds, respectively.
- Regarding FY2014 surveys, endrin was detected in all three sites for bivalves, in 18 out of 19 sites for fish and in all two sites for birds, with concentrations for bivalves, fish and birds ranging from 8 to 84 pg/g-wet, ND to 140 pg/g-wet, and 4 to 5 pg/g-wet respectively (detection limit: 1 pg/g-wet).
- Aldrin was detected only from fish at concentration ranges of ND to 2.4 pg/g-wet, detection limit being of 0.7 pg/g-wet. Aldrin was not detected from bivalves and birds.

(ii) Air

- No significant trend was observed through FY2002 to FY2014 for aldrin, dieldrin or endrin.
- Regarding FY2014 surveys, dieldrin was detected in all 36 sites and endrin detected in 32 out of 36 sites.
- The concentration of dieldrin ranged from 0.89 to 160 pg/m^3 (for warm season).

Furthermore, the concentration of endrin ranged from ND to 2.9 pg/m^3 (for warm season) (detection limit for endrin: 0.07 pg/m^3).

- Regarding FY2014 surveys, aldrin was detected; concentration ranging from ND to 17 pg/m^3 (for warm season), in six out of 34 sites (detection limit: 4 pg/m^3).

(iii) Water

- Statistical analysis from FY2002 to FY2014 indicated a significant decreasing trend in concentration of endrin in lakes and sea areas. No significant trend was observed through FY2002 to FY2014 for endrin and dieldrin in overall areas. As for aldrin, no significant trend was observed through FY2002 to FY2009 surveys.
- Regarding FY2014 surveys, dieldrin and endrin were detected in all 48 sites; concentration levels were in the range from 2.7 to 200 pg/L and 0.4 to 25 pg/L, respectively.
- Regarding FY2009 surveys, aldrin was detected in 32 out of 49 sites with concentrations ranging from ND to 22 pg/L (detection limit: 0.3 pg/L).

(iv) Sediment

- Statistical analysis from FY2002 to FY2018 indicated a significant decreasing trend in concentration of aldrin in sea areas and dieldrin in rivers. Decreasing trends in concentration of aldrin and dieldrin in overall areas were also identified as statistically significant. No significant trend was observed through FY2002 to FY2018 for endrin.
- Regarding FY2018 surveys, aldrin was detected in 50 out of 61 sites at concentration levels of ND to 270 pg/g-dry. Dieldrin was detected in 60 out of 61 sites at concentration levels of ND to 860 pg/g-dry. Endrin was detected in 48 out of 61 sites at concentrations levels of ND to 7,500 pg/g-dry (detection limit: 0.6 pg/g-dry for aldrin and dieldrin, 0.9 pg/g-dry for endrin).

(5) DDT

The government started the measurement of DDTs (p,p'-DDT, o,p'-DDT, p,p'-DDE, o,p'-DDE, p,p'-DDD and o,p'-DDD) on biological specimens in 1978. Water and bottom sediment specimens were monitored for p,p'-DDT, p,p’-DDE and p,p’-DDD from 1986 to 1998 and from 1986 to 2001, respectively. In 2002, a high-sensitivity analytical method was adopted and monitoring has continued for six DDTs in all specimens. DDTs were decided to be monitored less frequently after FY2009.

(i) Wildlife

- Statistical analysis from FY2002 to FY2018 indicated a significant decreasing trend in concentrations of p,p'-DDD, o,p'-DDT, and o,p'-DDD in bivalves. The decrease in concentration of p,p'-DDT in fish were also identified as statistically significant.
- Regarding FY2018 surveys, all of the six DDTs were detected in all three sites for bivalves, 18 sites for fish and two sites for birds. The total concentrations were within the range of 220 to 4,400 pg/g-wet, 390 to 27,000 pg/g-wet and 22,000 to 290,000 pg/g-wet for bivalves, fish and birds, respectively.
- Of the six DDTs, the metabolite p,p'-DDE tends to dominate in wildlife specimens (see Figure 4 of the Appendix). As for fish, higher p,p'-DDE concentration was observed in sea bass from Tokyo Bay. Regarding FY2018 surveys, higher concentration was also observed in sea bass from Osaka Bay (see Figure 5 of the Appendix).

(ii) Air

- Statistical analysis from FY2003 to FY2018 indicated a significant decreasing trend in concentrations of five DDTs (excluding p,p'-DDD) in warm season.
- Regarding FY2018 surveys, all six DDTs were detected in all 37 sites in warm seasons, with total concentration ranged of 0.62 to 72 pg/m^3.

(iii) Water

- Statistical analysis from FY2002 to FY2014 indicated a significant decreasing trend in the concentrations of p,p'-DDT in lakes, o,p'-DDT in rivers, lakes, estuaries and sea areas, and p,p'-DDT and o,p'-DDT in overall areas. For o,p'-DDE, results obtained during the last four years of the study were considered lower than the ones obtained during the first four years of the study in sea and overall areas. No significant trends were observed for p,p'-DDE, p,p'-DDD and o,p'-DDD.
- Regarding FY2014 surveys, all six DDTs were detected in all 48 sites. The total concentration was in the range of 5.0 to 1,300 pg/L.

(iv) Sediment

- Statistical analysis from FY2002 to FY2014 indicated a significant decreasing trend in the concentrations of o,p'-DDT in estuaries. No significant trend was observed through FY2002 to FY2014 for any of the remaining five DDTs.
- Regarding FY2014 surveys, all six DDTs were detected in all 63 sites with the concentration range varied from 26 to 110,000 pg/g-dry.

(6) Chlordane

Chlordanes (trans-chlordane, cis-chlordane, trans-nonachlor, cis-nonachlor and oxychlordane) were monitored in wildlife from FY1983 to FY2001. As for water and sediment specimens, monitoring surveys were conducted from FY1986 to FY1998 and FY1986 to FY2001, respectively, for five isomers excluding oxychlordane.

Between FY2002 and FY2013, the government conducted annual monitoring surveys for wildlife, air, water and sediment, however chlordanes were decided to be monitored less frequently after FY2014. As most recent surveys were conducted in FY 2016 for wildlife and air, and in FY2017 for water and sediment, those results are presented below.

(i) Wildlife

- For bivalves and fish, no significant trend was observed through FY2002 to FY2016 for all five chlordanes.
- Regarding FY2016 surveys, all five chlordanes have been detected in all three sites for bivalves, 19 sites for fish and two sites for birds. The total concentrations ranged from 280 to 1,600 pg/g-wet, 360 to 8,100 pg/g-wet (see Table 8 of the Appendix) and 360 to 2,500 pg/g-wet for bivalves, fish and birds, respectively.

(ii) Air

- Since FY2002, chlordanes are detected in all sites. Statistical analysis from FY2002 to FY2016 indicated a significant decreasing trend in concentrations of all five chlordanes in warm season. Regarding FY2016 surveys, chlordanes were detected in all 37 sites, and total concentration ranged from tr(2.7) to 2,700 pg/m^3 for warm season.

(iii) Water

- Since FY2002, chlordanes are detected in almost all sites. Statistical analysis from FY2002 to FY2017 indicated a significant decreasing trend in concentrations of cis-chlordane in rivers, estuaries, sea areas and overall areas. Reduction tendency in the concentrations of trans-nonachlor in rivers was also identified as statistically significant. No significant trends were identified for trans-chlordane, oxychlordane, cis-nonachlor and trans-nanochlor for overall areas.
- Regarding FY2017 surveys, chlordanes were detected in all 47 sites within the total concentration range of tr(8) to 530 pg/L.

(iv) Sediment

- The chlordanes concentration in bottom sediment tends to be relatively high near large cities. Statistical analysis from FY2002 to FY2017 indicated a significant decreasing trend in the concentrations of cis-chlordane, trans-chlordane, cis-nonachlor and trans-nonachlor in overall areas (see Figure 6 of the Appendix). For oxychlordane, results obtained during the second-half period were considered lower than the ones obtained during the first half period in overall areas.
- Regarding FY2017 surveys, chlordanes were detected in 60 out of 62 sites within the total concentration range from ND to 9,400 pg/g-dry (see Table 9 of the Appendix).

(7) Heptachlor

The government started the measurement of heptachlor for water, bottom sediment and wildlife in 1982. It started the measurement of air in 1986. The heptachlor epoxide concentration was measured in 1982 and 1996 in water, bottom sediment and wildlife, and in 1986 in air. Annual and continual monitoring surveys using high-sensitivity analytical method have started from FY2002 for heptachlor and FY2003 for cis-heptachlor epoxide and trans-heptachlor epoxide, however they were decided to be monitored less frequently after FY2013. As most recent surveys were conducted in FY2016 for wildlife and water, and in FY 2017 for water and sediment, those results are presented below.

(i) Wildlife

- No significant trend was observed through FY2002 to FY2016.
- Regarding FY2016 surveys, cis-heptachlor epoxide was detected in all three sites for bivalves, 19 sites for fish and two sites for birds. Heptachlor was detected in one out of three sites for bivalves and from eight out of 19 sites for fish, but was not detected in birds (detection limit: 0.9 pg/g-wet). Trans-heptachlor epoxide was detected in none of the wildlife (detection limit: 3pg/g-wet). The total concentrations of heptachlors (heptachlor, cis-heptachlor epoxide and trans-heptachlor epoxide) were within the range of tr(10) to 76 pg/g-wet, ND to 130 pg/g-wet and 31 to 270 pg/g-wet for bivalves, fish and birds, respectively (detection limit: 4.6 pg/g-wet).

(ii) Air

- Statistical analysis from FY2002 to FY2016 indicated a significant decreasing trend in the concentrations of heptachlor and cis-heptachlor epoxide for warm seasons. Although the number of detections was small, the detection rate was decreasing, it suggested a reduction tendency for trans-heptachlor epoxide.

- Regarding FY2016 surveys, heptachlor and cis-heptachlor epoxide were detected in all 37 sites in warm season. Trans-heptachlor epoxide was only detected in one site (detection limit 0.1 pg/m^3). The total concentrations of heptachlors were within the range of tr(0.5) to 130 pg/m^3 for warm season.

(iii) Water

- Statistical analysis from FY2003 to FY2017 indicated a significant decreasing trend in the concentrations of cis-heptachlor epoxide in rivers.
- Regarding FY2014 surveys, cis-heptachlor epoxide was detected in 46 out of 47 sites, while heptachlor was detected in two sites and trans-heptachlor epoxide was not detected in any site (detection limit: 0.9 pg/L). Heptachlors were detected in 32 out of 48 sites and the total concentrations were in the range of ND to 88 pg/L (detection limit: 2.5 pg/L).

(iv) Sediment

- Based on the statistical analysis from FY2003 to FY2017 for heptachlor in estuaries and cis-heptachlor epoxide in overall areas and rivers, results obtained during the last seven years of the studies were considered lower than the ones obtained during the first seven years.
- Regarding FY2017 surveys, cis-heptachlor epoxide was detected in 51 out of 62 sites, while heptachlor was detected in 53 sites, and trans-heptachlor epoxide was not detected in any site (detection limit: 0.5 pg/g-dry for cis-heptachlor epoxide, 0.3 pg/g-dry for heptachlor, 0.8 pg/g-dry for trans-heptachlor epoxide). The total concentrations of heptachlors were within the range of ND to 160 pg/g-dry (detection limit: 1.6 pg/g-dry).

(8) Toxaphene

The government started the monitoring of toxaphene in water and bottom sediment in 1983. No toxaphene was detected above the minimum detectable level of 0.3 to 0.6 μg/L for water and 0.01 to 0.04 μg/g-dry for bottom sediment. A high-sensitive analytical method was introduced in FY2003, and Parlar-26, Parlar-50, and Parlar-62 were monitored annually as toxaphenes. With the increasing numbers of chemicals listed in the Stockholm Convention, the frequency of surveys was reviewed, and toxaphenes were decided to be monitored less frequently from FY2010 since toxaphenes were never used domestically.

(i) Wildlife

- Regarding FY2018 surveys, Parlar-26 was detected in the concentration range of ND to tr(15) pg/g-wet, ND to 280 pg/g-wet and 53 to 54 pg/g-wet for bivalves, fish and birds, respectively (detection limit: 8 pg/g-wet; Parlar-26 was detected in two out of three sites for bivalves, 12 out of 18 sites for fish and all two sites for birds). Parlar-50 was detected in the concentration range of ND to 17 pg/g-wet, ND to 300 pg/g-wet and tr(11) to tr(13) pg/g-wet for bivalves, fish and birds (detection limit: 6 pg/g-wet; Parlar-50 was detected in two out of three sites for bivalves, 16 out of 18 sites for fish and all two sites for birds). Parlar-62 was only detected in fish, and its concentrations were ND to 150 pg/g-wet (detection limit: 40 pg/g-wet; Parlar-62 was detected in 3 out of 18 sites for fish). Parlar -62 was not detected in all three sites for bivalves and two sites for birds (detection limit: 40 pg/g-wet)

(ii) Air

- Regarding FY2018 surveys, Parlar-26 was detected in 12 out of 37 sites in warm season with the concentration range of ND to tr(0.3) pg/m^3 (detection limit: 0.2 pg/m^3). Parlar-50 was detected in two out of 37 sites with the concentration range of ND to tr(0.2) pg/m^3 (detection limit: 0.2 pg/m^3). Parlar-62 was not detected in all 37 sites (detection limit: 0.2 pg/m^3).

(iii) Water

- Regarding FY 2018 surveys, Parlar-26 was detected in seven out of 47 sites with the concentration range of ND to 5 pg/L (detection limit: 2 pg/L). Parlar-50 was detected in one out of 48 sites with the concentration of tr(2) pg/L (detection limit: 2 pg/L). Parlar-62 was not detected in all 47 sites (detection limit: 20 pg/L).

(iv) Sediment

- Regarding FY 2018 surveys, Parlar-26 was not detected in all 61 sites (detection limit: 3 pg/g-dry). Parlar-50 and Parlar-62 was detected in one out of 61 sites with the concentration of tr(3) pg/g-dry and tr(20) pg/g-dry, respectively (detection limit: 3 pg/g-dry for Parlar-50 and 20 pg/g-dry for Parlar 62).

(9) Mirex

The government surveyed the concentration of mirex in water and bottom sediment in 1983, and no mirex was detected above the minimum detectable level of 0.01 μg/L for water and 0.0006 to 0.0024 μg/g-dry for bottom sediment. A high-sensitive analytical method was

introduced in FY2003 and annual monitoring was conducted on wildlife, air, water and sediment. With the increasing numbers of chemicals in the Stockholm Convention, the frequency of surveys was reviewed, and mirex was decided to be monitored less frequently from FY2010, since mirex was never used domestically.

(i) Wildlife

- No statistically significant trend was observed through the surveys from FY2003 to FY2018 for bivalves and fish.
- Regarding FY2018 surveys, mirex was detected in all three sites for bivalves, 18 sites for fish and two sites for birds; concentration ranging from 1.8 to 20 pg/g-wet, 1.9 to 70 pg/g-wet and 47 to 260 pg/g-wet for bivalves, fish and birds, respectively.

(ii) Air

- No statistically significant trend was observed through the surveys from FY2003 to FY2018.
- Regarding FY2018 surveys, mirex was detected in all 37 sites in warm season at concentration range of 0.05 to 0.2 pg/m^3.

(iii) Water

- No statistically significant trend was observed through the surveys from FY2003 and FY2018.
- Regarding FY2018 surveys, mirex was detected in three out of 47 sites at concentration range of ND to 1.0 pg/L with a detection limit of 0.3 pg/L.

(iv) Sediment

- No statistically significant trend was observed through the surveys from FY2003 to FY2018.
- Regarding FY2018 survey, mirex was detected in 44 out of 61 sites at concentration ranging from ND to 240 pg/g-dry at detection limit of 0.3 pg/g-dry.

(10) Hexachlorocyclohexanes (HCHs)

Monitoring of HCHs was conducted for wildlife from FY1978 to FY2001 (excluding FY1997 and FY1998) with the main focus on α- and β-HCH. Water and sediment specimens were also monitored from FY1986 to FY1998 and from FY1986 to FY2001, respectively. Annual surveys in water, sediment and wildlife have been conducted on α- and β-HCH from FY2002, and γ- and δ-HCH from FY2003. Air specimens have also been monitored for all four

isomers from FY2009.

Since no survey was conducted in FY2018, the results of the surveys conducted in FY2017 are summarized below.

(i) Wildlife

- Statistical analysis from FY2003 to FY2017 indicated a significant decreasing trend of γ-HCH in bivalves. In fish, results of γ-HCH obtained during the last five years of the study were considered lower than the ones obtained during the first five years of the study. Furthermore, statistical analysis from FY2002 to FY2017 also indicated a significant decreasing trend in concentration of α-HCH in bivalves. No significant trend was observed for β-HCH. As for δ-HCH in fish, results obtained in the last five years of the studies were lower than the ones in the first five years.
- Regarding FY2017 surveys, all four HCH isomers were detected in almost all three sites for bivalves, 19 sites for fish and two sites for birds. The concentration of α-, β-, γ- and δ-HCH in bivalves were 6 to 32 pg/g-wet, 21 to 60 pg/g-wet, tr(2) to 11 pg/g-wet and tr(1) to 3 pg/g-wet, respectively. The concentration of α-, β-, γ- and δ-HCH in fish were ND to 130 pg/g-wet, 4 to 290 pg/g-wet, ND to 30 pg/g-wet and ND to 23 pg/g-wet, respectively. The concentration of α-, β-, γ- and δ-HCH in birds were 7 to 930 pg/g-wet, 300 to 3,500 pg/g-wet, tr(1) to 20 pg/g-wet and ND to tr(1) pg/g-wet, respectively (detection limit of α-HCH 1 pg/g-wet, γ-HCH 1 pg/g-wet and δ-HCH 0.9 pg/g-wet).

(ii) Air

- Regarding FY2017 surveys, all four isomers were detected in almost all 37 sites. The concentrations of α-, β-, γ- and δ-HCH in warm season were 4.9 to 700 pg/m^3, 0.67 to 59 pg/m^3, 0.84 to 93 pg/m^3 and ND to 46 pg/m^3, respectively (detection limit of δ-HCH: 0.03 pg/m^3).

(iii) Water

- Statistical analysis from FY2002 to FY2017 indicated a significant decreasing trend of α-HCH in overall areas, β-HCH in lakes, sea area and overall areas and γ-HCH in rivers, lakes, estuaries, sea areas and overall areas. No significant trend was observed for δ-HCH.
- Regarding FY2017 surveys, all four isomers were detected in all 47 sites. The concentrations of α-, β-, γ- and δ-HCH were 3.7 to 680 pg/L, 12 to 830 pg/L, 2.1 to 190 pg/L and tr(0.4) to 490 pg/L, respectively.

(iv) Sediment

- Statistical analysis from FY2002 to FY2017 indicated a significant decreasing trend in concentrations of α- HCH in rivers and overall areas, β-HCH in rivers, γ-HCH in rivers, sea areas and overall areas, and δ-HCH in estuaries, sea areas and overall areas .
- Regarding FY2017 surveys, all four isomers were detected in all 62 sites. The concentrations of α-, β-, γ- and δ-HCH were ranged from 1.0 to 1,900pg/g-dry, 5.7 to 3,400 pg/g-dry, tr(0.4) to 1,900 pg/g-dry and tr(0.2) to 1,700pg/g-dry, respectively.

(11) Hexabromobiphenyl (HBB)

The government conducted a wildlife monitoring of HBB in FY1989, monitoring on water and sediment in FY1989 and FY2003, as well as an air monitoring in FY1989 and FY2004. HBB was monitored annually from FY2009 to FY2011, and was monitored less frequently after FY2012. The results of the surveys conducted in FY2015 for wildlife, air, and sediment, and in FY2011 for water are summarized below.

Regarding FY2015 surveys, HBB was not detected in any site (detection limit: 5 pg/g-wet). Furthermore, HBB was detected in nine out of 62 sites in sediment specimens with concentration ranging from ND to 15 pg/g-dry (detection limit: 0.3 pg/g-dry), and in air with concentration ranging from ND to 1.1 pg/m^3 (detection limit: 0.02 pg/m^3). They were not detected in water in FY2011 (detection limit: 0.9 pg/L).

(12) Polybromodiphenyl ethers

The government has been monitoring polybromodiphenyl ethers (limited to congeners with four to ten bromines) in wildlife since FY2008 and in air, water and sediment since FY2009 (except in FY2013). Regarding FY2018 surveys, polybromodiphenyl ethers were detected in 10 out of 18 sites for fish and two sites for birds, and were not detected in any site for bivalves. The total concentrations ranged from ND to 800 pg/g-wet and 1,500 to 3,000 pg/g-wet for fish and birds, respectively (detection limit:130 pg/p-wet). In air, water and sediment specimens, polybromodiphenyl ethers were detected in 31 out of 37 sites, 45 out of 47 sites and 58 out of 61 sites, respectively. The total concentration ranged from ND to 24 pg/m^3, ND to 3,200 pg/L, ND to 580,000 pg/g-dry for air, water and sediment, respectively. The detection limits were 1.3 pg/m^3, 19 pg/L and 30 pg/g-dry for air, water and sediment, respectively.

(13) Perfluorooctane sulfonic acid (PFOS)

The government conducted monitoring surveys on PFOS for wildlife and sediment in FY2003 and FY2005, a water monitoring in FY2002 and FY2005 and an air monitoring in FY2004. PFOS has been continually monitored since FY2009. Regarding FY 2018 surveys, PFOS was detected in 42 out of 47 sites for water and 55 out of 61 sites of sediment, with the concentration ranged of ND to 4,100 pg/L and ND to 700 pg/g-dry, respectively (detection limit: 30 pg/L for water and 3 pg/g-dry for sediment). Statistical analysis from FY2009 to FY2018 indicated a significant decreasing trend in water of lakes and sediment of sea areas. Regarding FY2017 surveys, PFOS was detected in all sites for wildlife and air. It was detected in two out of three sites for bivalves, all 19 sites for fish, all two sites for birds, and all 37 sites for air. The concentration ranged from ND to 160 pg/g-wet, tr(4) to 11,000 pg/g-wet, 3,000 to 32,000 pg/g-wet, and 1.1 to 8.9 pg/m^3 for bivalves, fish, birds, and air, respectively (detection limit: 4 pg/g-wet for wildlife). No significant trend of PFOS concentration in wildlife was observed through FY2003 to FY2017. Meanwhile, statistical analysis from FY2004 to FY2017 indicated a significant decreasing trend of PFOS concentration in air.

(14) Pentachlorobenzene (PeCB)

The government conducted surveys on PeCB for wildlife from FY1979 to FY1985, every other year from FY1986 to FY1996, in FY1999, FY2007 and from FY2010 to FY2018. PeCB was monitored in water in FY1979, FY2007, from FY2010 to FY2018 (except for FY2016). Monitoring survey in sediment was conducted in FY 1979, FY2007, and from FY 2010 to FY2018. Air monitoring was conducted in FY1994, FY1999 and from FY2010 to FY2018.

Regarding FY2018 surveys, PeCB was detected in almost all sites for wildlife, air, water, and sediment. PeCB was detected in all three sites in bivalves, 15 out of 18 sites in fish and all two sites in birds. The concentration detected in wildlife ranged from tr(5) to tr(13) pg/g-wet, ND to 70 pg/g-wet and 280 to 480 pg/g-wet for bivalves, fish and birds, respectively. In air, water and sediment specimens, PeCB was detected in all 37 sites, 47 sites and 61 sites, respectively. The concentration ranged from 30 to 100 pg/m^3, 2.7 to 320 pg/L and 1.2 to 3,400 pg/g-dry for air, water and sediment, respectively. Statistical analysis form FY2007 to FY2018 indicated a significant decreasing trend in sediment of sea.

(15) Chlordecone

The government conducted surveys of chlordecone for air in FY2003, and for wildlife, water and sediment in FY2008. In FY2010 and FY2011, the surveys for wildlife, air, water and sediment was conducted. Regarding FY2011 surveys, chlordecone was not detected in bivalves

(four sites), in fish (18 sites), in bird (one site) and in air (37 sites) (detection limit: wildlife 0.2 pg/g-wet and air 0.02 pg/m^3). Chlordecone was detected in 15 out of 49 sites for water and nine out of 64 sites for sediment. The concentration in water and sediment ranged from ND to 0.7 pg/L and ND to 1.5 pg/g-dry, respectively (detection limit: water 0.05 pg/L and sediment 0.20 pg/g-dry).

(16) Endosulfan

Isomers of endosulfans (α-endosulfan and β-endosulfan) were monitored in wildlife, air, water and sediment in FY2011 and FY2012. Monitoring surveys were also conducted from FY2014 to FY2015 for wildlife, from FY2014 to FY2016 for air, in F2018 for water and sediment.

Regarding the FY2015 surveys, endosulfans were detected in one out of three sites for bivalves and one out of 19 sites for fish, with concentration ranging from ND to 160 pg/g-wet and ND to tr(59) pg/g-wet, respectively. They were not detected in one site of birds (detection limit: 49 pg/g-wet).

Regarding the FY2016 surveys, endosulfans were detected in air at all 37 sites with a concentration range of tr(1.0) to 49 pg/m^3.

Regarding the FY2018 surveys, endosulfans were detected in one out of 48 sites in water and 12 out of 61 sites in sediment, with concentration ranging from ND to tr(60) pg/L and ND to 70 pg/g-dry, respectively (detection limit: 50 pg/L for water and 4 pg/g-dry for sediment).

(17) Hexabromocyclododecane (HBCD)

HBCDs (α-HBCD, β-HBCD, γ-HBCD, δ-HBCD and ε-HBCD) was monitored in wildlife, water and sediment in FY2011, and were also monitored in wildlife, air and sediment in FY2012. Monitoring surveys were also conducted in FY2014 for water, wildlife and air, from FY2015 to FY2017 for wildlife and air, and in FY2018 for wildlife.

Regarding the FY2018 surveys, HBCDs were detected in all three sites for bivalves, 14 out of 18 sites for fish and all two sites in birds, at concentration ranges of 76 to 310 pg/g-wet, ND to 660 pg/g-wet, 590 to 610 pg/g-wet, respectively (detection limit: 25 pg/g-wet).

Regarding the FY2017 surveys, HBCDs were detected in 32 out of 37 sites for air, at the concentration ranged from ND to 4.6 pg/m^3 (detection limit: 0.3 pg/m^3).

Regarding the FY2016 surveys, HBCDs were detected in 40 out of 62 sites for sediment, at the concentration ranged from ND to 67,000 pg/g-dry (detection limit: 170 pg/g-dry).

Regarding the FY2014 surveys, HBCDs were detected in one out of 48 sites for water,

at the concentration ranged from ND to 1.9 pg/L (detection limit: 1.5 pg/L).

(18) Polychlorinated naphthalenes (PCNs)

PCNs (congeners with one to eight chlorines) were monitored in wildlife from FY1978 to FY1985, every other year from FY1987 to FY1993, and from FY2002 to FY2008, and were monitored annually since FY2015.

Monitoring surveys were conducted for water and sediment in FY2001 and FY2008, and FY2018 for water and from FY2016 to FY2018 for sediment.

Monitoring surveys were conducted for air in FY1998, FY2002, FY2008 and FY2014, and were conducted annually from FY2016.

Regarding the FY2018 surveys, PCNs were detected in all three sites for bivalves, in 16 out of 18 sites for fish and in all two sites for birds, with the concentration ranging from tr(13) to 700 pg/g-wet, ND to 520 pg/g-wet, and 200 to 250 pg/g-wet for bivalves, fish and birds, respectively (detection limit: 12 pg/g-wet). PCNs were detected in 39 out of 47 sites for water, in all 61 sites for sediment, and in all 37 sites for air, with a concentration range of ND to 260 pg/L, 9.9 to 34,000 pg/g-dry, and 5.3 to 590 pg/m^3, respectively (detection limit: 12 pg/L for water).

(19) Hexachlorobutadiene (HCBD)

HCBD was monitored in wildlife, water and sediment in FY2007 and FY2013, and was monitored in air annually from FY2015. Regarding the FY2013 surveys, HCBD was detected in one out of five sites for bivalves and four out of 19 sites for fish, at concentration ranges of ND to 7.1 pg/g-wet and ND to 59 pg/g-wet, respectively. It was not detected in birds at two sites. Detection limit for wildlife was 3.7 pg/g-wet. Furthermore, HCBD was also detected in water from one out of 48 sites and in sediment from 20 out of 63 sites, with a concentration range of ND to 43 pg/L and ND to 1,600 pg/g-dry, respectively (detection limit for water: 37 pg/L and for sediment: 3.8 pg/g-dry). Regarding the FY2018 surveys, HCBD was detected in all 37 sites for air, at concentration ranges of 150 to 8,500 pg/m^3.

(20) Pentachlorophenol (PCP)

PCP was monitored in wildlife and air form FY2016 to FY2018, in water in FY1974, FY1996, FY2005, FY2015, FY2017 and FY2018, and in sediment in FY1974, FY1996, FY2017 and FY2018. Regarding the FY2018 surveys, PCP was detected in all three sites for bivalves, in 13 out of 18 sites for fish, and in all two sites for birds, with concentration ranges of tr(10) to 30 pg/g-wet, ND to 80 pg/g-wet, and 180 to 1,200 pg/g-wet, respectively (detection limit: 10 pg/g-dry). PCP was detected in 44 out of 47 sites for water, in 59 out of 61 sites for

sediment, and in all 37 sites for air, with concentration ranges of ND to 4,400 pg/L, ND to 3,900 pg/g-dry, and 0.9 to 30 pg/m^3 (detection limit: 9 pg/L for water, 6 pg/g-dry for sediment and 0.2 pg/m^3 for air).

(21) Short-chain chlorinated paraffins (SCCPs)

SCCPs (chlorinated decane, chlorinated undecane, chlorinated dodecane and chlorinated tridecane) were monitored in wildlife, water, and sediment in FY2004 and FY2005, in wildlife and air in FY2016, and in wildlife, air, water, and sediment in FY2017 and FY2018. Regarding the FY2018 surveys, SCCPs were not detected in any site for wildlife (detection limit: 2,200 pg/g-wet). SCCPs were detected in 13 out of 47 sites for water, 16 out of 61 sites for sediment, and all 37 sites for air, with concentration ranges of ND to 13,000 pg/L, ND to 73,000 pg/g-dry, and tr(340) to 4,800 pg/m^3, respectively (detection limit: 4,000 pg/L for water, 12,000 pg/g-dry for sediment, 210 pg/m^3 for air).

(22) Dicofol

Dicofol (p,p'-dicofol) was monitored in water and sediment in FY1978, in sediment in FY2004, in wildlife in FY2006, in wildlife, water, and sediment in FY2008, in air in FY2016, and in wildlife in FY2018.

Regarding the FY2018 surveys, dicofol was detected in one out of three sites for bivalves, and nine out of 18 sites for fish, with concentration ranges of ND to 30 pg/g-wet and ND to 280 ng/g-wet, respectively (detection limit: 10 ng/g-wet). Dicofol was not detected in any site for birds (detection limit: 10 ng/g-wet). Regarding the FY2008 surveys, dicofol was detected in 13 out of 48 sites for water and 13 out of 63 sites for sediment, with concentration ranges of ND to 0.076 ng/L and ND to 0.46 ng/g-dry, respectively (detection limit: 0.010 ng/L for water, 0.063 ng/g-dry for sediment). Regarding the FY2016 surveys, dicofol was detected in 10 out of 37 sites for air, with the concentration ranged from ND to 1.0 pg/m^3 (detection limit: 0.2 pg/m^3).

(23) Perfluorooctanoic acid (PFOA)

PFOA was monitored in wildlife and sediment in FY2003 and FY2005, in air in FY2004, and in water in FY2005. Monitoring surveys were also conducted from FY2009 to FY2017 (except for FY2013) for wildlife, from FY2010 to FY2018 (except for FY2013 and FY2017) for water and sediment, and from FY2010 to FY2017 for air.

Regarding the FY2017 surveys, PFOA was detected in two out of three sites for bivalves, 19 out of 21 sites for fish and all two sites for birds, with concentration ranges of ND to 18 pg/g-wet, ND to 79 pg/g-wet, and 85 to 680 pg/g-wet, respectively

(detection limit: 4 pg/g-wet). PFOA was also detected in all 37 sites for air with a concentration ranged from tr(2.0) to 150 pg/m^3 (detection limit: 1.1 pg/m^3). No significant trend was observed through FY2003 to FY2017 in wildlife, and through FY2004 to FY2017 in air.

Regarding the FY2018 surveys, PFOA was detected in all 47 sites for water and 58 out of 61 sites in sediment, with concentration ranges of 160 to 28,000 pg/L and ND to 190 pg/g-dry, respectively (detection limit: 30 pg/L for water, 4 pg/g-dry for sediment). Statistical analysis from FY2009 to FY2018 indicated a significant decreasing trend of PFOA concentration in water of estuaries, and in sediment of rivers and estuaries.

(24) Summary

The general environmental situation of Japan can be summarized as follows with respect to the chemicals discussed above;

(i) Among chemicals subject to environmental quality standards, these standards were met for dioxins and PCBs at most and all sites surveyed, respectively.

(ii) With regard to chemicals other than dioxins that have been continuously monitored using a high-sensitive analytical method since FY2002, the average concentration or the detection rate have remained almost constant. Nonetheless, these indicators have been decreasing for most POPs during the last 30 years.

(iii) Higher concentrations were observed in water and sediment samples from areas readily affected by human activities such as harbors and semi-closed sea area aside coasts of large cities.

(iv) For wildlife specimens, high concentrations of POPs such as PCBs and DDTs were observed in fish caught from coastal areas with densely populated cities.

2. Effectiveness evaluation of measures taken and remaining problems

(1) Dioxins

With respect to dioxins, the guidelines for waste incinerators were established in 1990. In 1992, guidance was provided to pulp and paper factories on emission control measures. Measures against dioxins were strengthened as emission control was imposed in 1997 on waste incinerators and electric steel-making furnaces under Air Pollution Control Law. Further, comprehensive measures are implemented in accordance with the Dioxins Law established in 1999. The Government Plan to Reduce Dioxins Levels Resulting from Business Activities in

Japan (the third Reduction Plan), which was developed in August 2012 under the Dioxins Law, set a target of reducing emission rates up to 176 g-TEQ/year. Dioxins emissions in 2018 totaled 117 to 119 g-TEQ/year, which achieved the reduction target. This is tantamount to an approximately 98.5% to 98.6% reduction from the 1997 level, the first year of enforcement of the law. The status of environmental pollution has greatly improved due to the significant reduction of dioxins emissions. In recent years, achievement rates stood at close to 100% vis-a-vis environmental standards for each survey medium. In light of these achievements, considering that the improved environment would not be exacerbated, reduction measures on releases will continue to be implemented precisely in the future.

(2) Polychlorinated biphenyls (PCBs)

PCBs are designated as Class I Specified Chemical Substance under the Chemical Substances Control Law and thus their manufacture, import and use are virtually prohibited. Since 2001, efforts have been made to properly treat PCB wastes in accordance with the PCB Special Measures Law.

As for PCBs unintentionally produced, it was found in February 2012 that PCBs were included as residues in certain types of organic pigments that have a wide range of domestic uses. Therefore, to establish the industrially and economically achievable minimal level of unintentionally produced PCBs, principles governing the by-production of PCBs, its management and analysis procedures have been discussed since July 2012. In January 2016, the "Report on the industrially and economically achievable minimal levels of unintentionally produced PCBs in organic pigments" was prepared. Based on this report, information on management of chemical substances containing unintentionally produced Class I Specified Chemical Substance has just been released to the concerning organizations and operators in March 2016, and the provisions for the reduction of PCB by-production are promoted.

Furthermore, as the sources and categories of emission and formation processes for PCBs unintentionally produced by other ways than for organic pigments are similar to those of dioxins, the measures currently taken for dioxins are basically expected to help reduce unintentionally produced PCBs as well.

(3) Hexachlorobenzene (HCB)

As a Class I Specified Chemical Substance, the manufacture, import and use of hexachlorobenzene are virtually prohibited under the Chemical Substances Control Law. Meanwhile, the source categories of emission and formation processes for HCB produced unintentionally are similar to those for dioxins. Therefore, the measures currently taken for dioxins are expected to help reduce HCB concentrations as well. Nevertheless, HCB is still

detected in the environment. Therefore, it is required to monitor the concentrations constantly as well as to promote measures to reduce HCB emissions.

(4) Drins and heptachlor

The manufacture, use and other activities regarding drins (aldrin, dieldrin and endrin) and heptachlor have been regulated since the 1970s-1980s under the Chemical Substances Control Law, the Agricultural Chemicals Regulation Act and other regulations. Decreasing trends in concentrations of drins and heptachlor in some environmental media have been observed, although they are still detected in the environment. When crops particularly prone to absorb drins are cultivated in fields where such chemicals had been used, there are cases for drins to be found exceeding the Maximum Residue Limit. Therefore, the government has promoted surveillance on soil and crops as well as a conversion of crops species, and conducted research and development for technology that enables reduction of absorption of drins and heptachlor in soil by crops.

(5) DDT

The manufacture, use and other activities regarding DDT have been regulated since the 1970s-1980s under the Chemical Substances Control Law, the Agricultural Chemicals Regulation Act and other regulations. Although DDT is still detected in the environment, decreasing trends in concentrations in some environmental media have been observed.

(6) Chlordane

The manufacture, use and other activities regarding chlordane have been regulated since the 1960s-1980s under the Chemical Substances Control Law, the Agricultural Chemicals Regulation Act and other regulations. Although chlordane is still detected in the environment, decreasing trends in concentrations in some environmental media have been observed.

(7) Toxaphene and mirex

There is no record of manufacture, import or use of toxaphene and mirex in Japan. A high-sensitivity analytical method was introduced in FY 2003. Since the 2003 survey, mirex has been detected in almost all specimens, although at a low level. Toxaphene was not detected in water or bottom sediment. Instead, it was found in some wildlife. Toxaphene was also detected in the air at the trace concentration. These two chemicals are designated as Class I Specified Chemical Substance under the Chemical Substances Control Law, and are designated as agricultural chemicals of which the distribution and use is prohibited under the Agricultural Chemicals Regulation Act. Therefore, under these laws, necessary measures to control these

chemicals have been already implemented.

(8) Hexachlorocyclohexanes (HCHs)

HCHs were used as agricultural chemicals and also as insecticides for termite control. As their registration expired in 1971 under the Agricultural Chemicals Regulation Act, they cannot be produced and imported as agricultural chemicals anymore, but were used as insecticides for termite control and wood treatment agents. As for α-, β- and γ-HCH (alias: Lindane), they were designated as Class I Specified Chemical Substance in April 2010 under the Chemical Substances Control Law, and their manufacture, import and use are virtually prohibited. Also, as for lindane related to agricultural use, its use and other activities have been already regulated since the 1970s under the Agricultural Chemicals Regulation Act.

(9) Hexabromobiphenyl (HBB)

HBB was used as a flame retardant for plastic products. It was designated as Class I Specified Chemical Substance in April 2010 under the Chemical Substances Control Law, and their manufacture, import and use are virtually prohibited.

(10) Polybrominated diphenyl ethers

Polybrominated diphenyl ethers were used as a flame retardant for plastic products. As for congeners with bromine number of 4 to 7, namely tetrabrominated diphenyl ethers, pentabrominated diphenyl ethers, hexabrominated diphenyl ethers and heptabrominated diphenyl ethers, and congener with bromine number of 10, which is decabromodiphenyl ether, were designated as Class I Specified Chemical Substance under the Chemical Substances Control Law in April 2010 and July 2017, respectively, and their manufacture, import and use are virtually prohibited.

(11) PFOS or its salts, and perfluorooctane sulfonyl fluoride (PFOSF)

PFOS or its salts, and PFOSF as their precursor were used as water/oil repellents and surface acting agents. They were designated as Class I Specified Chemical Substance in April 2010 under the Chemical Substances Control Law, and their manufacture, import and use are virtually prohibited. However, some uses of PFOS or its salts are approved based on the premise of stringent controls.

(12) Pentachlorobenzene (PeCB)

PeCB was used as a flame retardant. It was designated as Class I Specified Chemical Substance in April 2010 under the Chemical Substances Control Law, and its manufacture,

import and use are virtually prohibited. It has never been registered domestically as an agricultural chemical, while it has been applied for agricultural use overseas in the past.

As the sources and categories of emission and formation processes for unintentionally produced PeCB are similar to those of dioxins, it is admitted that the measures currently taken for dioxins apply for emission reduction of pentachlorobenzene as well. Since it is still detected in the environment, it is required to monitor the concentrations constantly as well as to promote measures to reduce its emissions.

(13) Chlordecone

Chlordecone is a kind of organochlorinated insecticide. It has never been registered domestically as an agricultural chemical, and there is no record of manufacture and import. It was designated as Class I Specified Chemical Substance in April 2010 under the Chemical Substances Control Law, and its manufacture, import and use are virtually prohibited.

(14) Endosulfan

Endosulfan is a kind of organochlorinated insecticide. Its registration expired in 2010 under the Agricultural Chemicals Regulation Act, and its distribution and use have been prohibited since April 2012 based on the same act. Also, endosulfan was designated as Class I Specified Chemical Substance in May 2014 under the Chemical Substances Control Law and their manufacture, import and use are virtually prohibited.

(15) Hexabromocyclododecanes (HBCDs)

HBCDs were used as a flame retardant. It was designated as Class I Specified Chemical Substance in May 2014 under the Chemical Substances Control Law, and their manufacture, import and use are virtually prohibited.

(16) Hexachlorobutadiene (HCBD)

HCBD was used as a solvent. It was designated as Class I Specified Chemical Substance in April 2005 under the Chemical Substances Control Law, and their manufacture, import and use are virtually prohibited.

(17) Polychlorinated naphthalenes (PCNs)

PCNs were used as additives in lubricants and preservatives. PCNs containing three or more chlorine atoms were designated as Class I Specified Chemical Substance in August 1979 under the Chemical Substances Control Law, and their manufacture, import and use are virtually prohibited. Furthermore, PCNs with two atoms of chlorine were designated as Class I

Specified Chemical Substance in April 2016 under the same law.

(18) Pentachlorophenol (PCP) and its salts and esters

PCP was used as an herbicide, disinfectant and repellent. Its registration expired in 1990 under the Agricultural Chemicals Regulation Act, and its distribution and use have been prohibited since April 2012 based on the same act. Furthermore, PCP and its salts and esters were designated as Class I Specified Chemical Substance in April 2016 under the Chemical Substances Control Law, and their manufacture, import and use are virtually prohibited.

(19) Short-chain chlorinated paraffins

SCCPs were used as a flame retardant. They were designated as polychlorinated linear-chain paraffins (limited to those that have 10 to 13 in the number of carbons and whose chlorine content is over 48% in the total weight) as Class I Specified Chemical Substance in April 2018 under the Chemical Substances Control Law, and their manufacture, import and use are virtually prohibited.

(20) Dicofol

Dicofol (p,p'-dicofol) was used as an herbicide. Its registration expired in 2004 under the Agricultural Chemicals Regulation Act, and its distribution and use have been prohibited since April 2010 based on the same act. Furthermore, p,p'-dicofol was designated as Class I Specified Chemical Substance in April 2005 under the Chemical Substances Control Law. In addition, o,p'-dicofol is expected to be designated as Class I Specified Chemical Substance under the Chemical Substances Control Law, and its manufacture, import and use will be virtually prohibited.

(21) PFOA, its salts and PFOA-related substances

PFOA, its salts and PFOA-related substances were used as processing aids in the production of fluoropolymers and surface acting agents. In the near future, they are expected to be designated as Class I Specified Chemical Substance under the Chemical Substances Control Law, and their manufacture, import and use will be virtually prohibited.

Chapter 3 Specific measures - strategy and elements of the National Implementation Plan

Section 1 Basic concept

The following is an overview of the basic concept of Japan about measures on the elimination and reduction of POPs emission.

It is important that Japan fully comply with the obligations under the Stockholm Convention, from the viewpoint of the protection of human health and conservation of the environment, as well as contribution to the international activities to eliminate and reduce emissions of hazardous chemical substances.

Recognizing the properties of POPs, the Japanese government, in cooperation with the other governments, the private sector and non-governmental organizations, will take measures to protect human health and the environment from the adverse effects caused by POPs at all stages of their lifecycles and will promote international cooperation in this connection.

Taking into account that developing countries (in particular the Least Developing Countries) and countries with economies in transition are more likely to suffer from health concerns resulting from local exposure to POPs, Japan will play a positive role to strengthen their national capabilities for the management of chemical substances including POPs (through the transfer of technology, the provision of financial and technical assistance and the promotion of cooperation among the Parties to the Stockholm Convention). We will also play a positive role in monitoring POPs at a regional level with a view to helping improve monitoring techniques and verifying the efficacy of measures in these regions.

Furthermore, keeping in mind the precautionary approach as set forth in Principle 15 of the Rio Declaration on Environment and Development as set out in Article 1 of the Stockholm Convention, Japan will act through international cooperation as necessary to add new substances to the list of substances regulated under the Stockholm Convention.

Section 2 Effective implementation of the plan

1. Framework of implementation and cooperation among actors

The national implementation plan represents a plan to promote concrete measures required under the Stockholm Convention. Therefore, the main actor for its implementation is the government. However, in enforcing the Convention, all the actors concerned of civil society,

which are the government, local public authorities, businesses and citizens, all being mindful of their respective responsibilities set forth in the Basic Environment Law (Law No. 91 of 1993), must work closely with each other. This has to be achieved by sharing a common understanding and by acting in line with the basic concept set forth in the national implementation plan.

Ministries and Agencies of the central government should ensure close cooperation through the Inter-Ministerial General Directors' Meetings. They should develop and implement measures set forth in the national implementation plan in a comprehensive and well planned manner. Though these measures in the implementation plan are developed and implemented by the Ministries and/or Agencies concerned, their effective implementation can be ensured by strengthening cooperation and coordination among the Ministries and Agencies as well as by concerted action. Depending upon issues and measures, frameworks for the participation of and coordination with various stakeholders including local public authorities, businesses and citizens will be created. The provision of information through the use of information technology (IT) and the exchange of information through coordination meetings will also be promoted while the activities of various stakeholders will be positively supported and assisted.

Local public authorities are expected to implement the measures similar to those taken by the central government as well as their own particular measures in a comprehensive and well planned manner in consistency with the basic thinking set forth in the national implementation plan and by taking into account their specific regional natural and social conditions. It is important that in implementing these measures, they should ensure close coordination and cooperation among the local public authorities concerned and develop and implement these measures from the planning stage through the implementation stage with the participation of and coordination with the local communities, Non-Governmental Organizations (NGOs) and experts.

It is also important that businesses and citizens recognize the importance of measures against POPs issues, take into account fully the possible repercussions to POPs issues in their business operations, daily lives and production activities and act voluntarily and positively in line with the basic thinking of the national implementation plan.

Non-profit private sector organizations engaged in environmental conservation activities are expected to play a major role in environmental conservation through carrying out these activities in an institutional manner from the perspectives of promoting the public good. These actors are expected to make further contribution in terms of promoting various measures through their participation in environmental research and conservation activities as well as in environmental education and environmental learning.

Efforts to ensure the implementation of the national implementation plan shall be pursued through a coherent implementation framework put in place by the central government

as well as coordination and cooperation among all the actors concerned of civil society.

With a view to ensuring the participation of and cooperation with various actors, the Government will also promote and facilitate the provision to the various actors of information on the contents of the Stockholm Convention, the purpose of the national implementation plan as well as measures which can be taken by each actor concerned.

Furthermore, in terms of ensuring global environmental protection, the Government has the obligation to contribute to international efforts in line with the implementation of domestic measures. Therefore, the government will work together with other developed countries on the implementation of the Stockholm Convention and provide assistance to developing countries.

2. Coordination of various national policies

Among the basic policies or plans closely related to measures against POPs pollution, there are the Basic Environment Plan, the Government Plan to Reduce Dioxin Levels Resulting from Business Activities in Japan (hereafter referred to as the Reduction Plan) and the Basic Plan for Polychlorinated Biphenyls (PCB) Waste Treatment. Japan will ensure consistency and closer coordination between measures based upon these basic policies and plans on one hand and the national implementation plan on the other.

In addition, it is fully ensured that plans and measures of the central government which are likely to have implications on the measures against POPs should be in line with the basic thinking of the national implementation plan.

Section 3 Regulatory measures designed to prevent the manufacture, use, import and export of persistent organic pollutants.

Among the laws regulating the manufacture, use, import and export of POPs in Japan, there are the Chemical Substances Control Law, the Agricultural Chemicals Regulation Act, the Pharmaceuticals and Medical Devices Act and the Foreign Exchange and Foreign Trade Act. Under these laws regulatory measures are taken with respect to the manufacture, use, import and export of chemical substances equivalent to POPs in terms of all of their aspects or uses. The following is an overview of these laws.

1. Measures under the Chemical Substances Control Law

Under the Chemical Substances Control Law, chemical substances which possess low degradability (i.e. resistant to chemical change by way of naturally occurring chemical reactions), high bioaccumulation (likely to be accumulated in bodies of living organisms) and long-term toxicity for humans or top-level predators (in cases of continuous ingestion, likely to be harmful to the survival or growth) are designated as Class I Specified Chemical Substance and are subject to regulatory measures such as prior notification for the manufacture/import (principally prohibited), limitation and prohibition of any use other than specified uses or mandatory reporting system, etc. However, even when chemicals are designated as Class I Specified Chemical Substance, they still can be used under stringent control if no alternatives exist and their uses would not threaten human health. Also, if chemicals designated as Class I Specified Chemical Substance are contained in other chemicals only in small amounts as by-product, they are not handled as Class I Specified Chemical Substance where it is confirmed that they do not pose any threats to human health through contamination of the environment, and their content rates have been lowered to technically and economically feasible levels.

As of April 2020, among the substances considered as subject to the regulation of the Stockholm Convention by the eighth Meeting of the Conference of the Parties, 33 chemical substances including 26 groups are designated as Class I Specified Chemical Substance, except PCDDs and PCDFs, which are not manufactured intentionally.

Regarding fire extinguisher, extinguishing agents for fire extinguisher and foam extinguishing agents that have been produced using PFOS or its salts, alternatives already exist, and they are unlikely to be manufactured/imported in the future. However, since large amounts have already been distributed nationwide, and it is quite difficult to replace them with alternatives in the short-term, the technical standards and labeling matters at the time of transfer to enable stringent control were prepared as provisional measures for the time being.

Also, for chemicals designated as Class I Specified Chemical Substances such as HCBs or PCBs that are found to exist as by-product in other chemicals in small amounts, technically and economically feasible levels were established individually, and operators are requested to achieve further reductions.

Operators intending to manufacture or import new chemical substances have to report the particulars of such chemical substances to the Minister of Health, Labour and Welfare, the Minister of Economy, Trade and Industry and the Minister of the Environment, who shall assess these chemical substances on the basis of the existing scientific knowledge and the data submitted by the operators.

In the future as well, chemical substances similar to POPs possessing low degradation,

high bioaccumulation, long-term toxicity for humans and long-term toxicity for top-level predators shall continue to be regulated under the Chemical Substances Control Law.

2. Measures under the Agricultural Chemicals Regulation Act

It is stipulated under the Agricultural Chemicals Regulation Act that the distribution of the agricultural chemicals having negative impacts on agricultural crops and living creatures, as described in item 4 to item 9 or item 11 of paragraph 1 of Article 4 shall be prohibited to prevent such effects under the ministerial ordinance on the basis of the stipulation of paragraph 2 of Article 18. The agricultural chemicals of which the distribution is prohibited shall also be prohibited to use by Article 24 of the act.

It has been currently prohibited under the act to distribute or use agricultural chemicals containing 17 chemicals designated under the Stockholm Convention, including aldrin, α-HCH, β-HCH, chlordane, chlordecone, dieldrin, endrin, heptachlor, HCB, lindane, mirex, PeCB, PCP, endosulfan, toxaphene, dicofol (p,p'-dicofol) and DDT.

The inspection method and the maximum content limit for dioxins in agricultural chemicals are stipulated in paragraph 3 of Article 31 of the Agricultural Chemicals Regulation Act. Also, the amount of the chemicals in all agricultural chemicals registered under the act has been below the stipulated level. Furthermore, for agricultural chemicals newly applied for registration, only those with the amount of the regulated chemicals found to be below the stipulated level through the inspection are to be registered.

3. Measures under the Pharmaceuticals and Medical Devices Act

Pharmaceuticals, quasi-drugs, cosmetics, medical devices and products of regenerative medicine can be distributed to the market only if they were approved for marketing authorization after evaluation of their validity, safety, etc. based on the Pharmaceuticals and Medical Devices Act, or meet the requirement stipulated by the act. Regarding the products containing PFOA, its salts and PFOA related substances, which are listed in Stockholm Convention, the efforts will be made to reduce such products based on the medical needs.

4. Measures under the Foreign Exchange and Foreign Trade Act

The Export Trade Control Order under the Foreign Exchange and Foreign Trade Act stipulates that POPs are subject to the requirement of export approval under Article 2 of the order as goods listed in 2.35.3 of the schedule of the said order. Under the Stockholm Convention not only the export of POPs themselves but also products containing POPs are subject to export control. The Operational Notification of the Export Trade Control Order specifically defines the scope of products which shall be subject to the requirement of export approval. Its Cautionary Notes on export set forth the conditions of export approvals such as the prohibition of the export of products containing PCBs.

Although the import of chemicals designated under the Stockholm Convention is already regulated by domestic regulations such as the Chemical Substances Control Law, but it is also regulated under the Import Trade Control Order based on the Foreign Exchange and Foreign Trade Act, as a complementary framework, to virtually prohibit their import.

The Export Trade Control Order and the Import Trade Control Order stipulate that the POPs wastes (including POPs containing products and articles upon becoming wastes) shall be subject to the requirement of import or export approval. These Orders, together with the relevant laws (the Waste Management Law and the Law for the Control of Export, Import and Others of Specified Hazardous Wastes and Other Wastes (Law No. 108 of 1992) etc. hereafter referred to as the Basel Law) ensure that stockpiles and wastes are disposed of in an environmentally sound manner in compliance with paragraph 1 (d) of Article 6 of the Stockholm Convention.

Section 4 Action Plan for Reduction of Emissions of Unintentionally Produced Chemicals

1. Dioxins

(1) Current and future release estimates in Japan

The current estimated amounts of releases (as of 2018) in Japan are shown in the table below. Estimated releases in 1997 when legal regulation was introduced are also shown in the same table. In Japan, PCDDs, PCDFs and coplanar PCBs are categorized as dioxins under the Dioxins Law.

Japan has limited land space available for sites for the final disposal of waste, and its hot and humid climate requires hygienic waste management. Therefore, waste disposal is

mainly conducted by incineration. The ratio of municipal waste incinerated is as high as approximately 79%, making waste incinerators one of the main generation sources of dioxins.

Given this situation, as described below, measures against dioxins have mainly focused upon controlling releases from waste incinerators, etc. Releases (estimate) in 2018 were 117-119 g-TEQ per annum, which represents a decline of approximately 98.5-98.6% from the level of releases in 1997 (7,680-8,135 g-TEQ per annum). Subsequently, environmental status has greatly improved, and as explained in Section 3, 1. (1), the proportion that has achieved the environmental standard stands at close to 100 percent. Under these circumstances, release reduction measures will be implemented appropriately so that the current environmental status will not be exacerbated.

Inventory of dioxins emission amount (Summary)

Source categories	Releases (g-TEQ per annum)	
	Estimated amount for 1997	Estimated amount for 2018
Subject to reduction target	7,680-8,135	115
Water	13	1
1. Waste disposal category	7,205-7,658	56
Water	5	0
Municipal waste incinerators	5,000	20
Industrial waste incinerators	1,505	18
Small scale waste incinerators (Subject to laws and regulations)	-	9.6
Small scale waste incinerators (Not subject to laws and regulations)	700-1,153	8.5
2. Industrial category	470	59
Water	6.3	0.6
Electric furnaces for steelmaking	229	28.7
Iron and steel industry sintering facilities	135	11.5
Zinc recuperation (collection) facilities	47.4	1.7
Aluminum alloys production facilities	31.0	9.7
Other facilities	27.3	6.9
3. Other sources	1.2	0.1
Water	1.2	0.1
Final sewage treatment facilities	1.1	0.1
Final dumping site	0.1	0.0
Subject to reduction target	3.6-6.2	2.4-4.4
Crematoria	2.1-4.6	1.4-3.4
Cigarettes smoke	0.1-0.2	0.1
Vehicles exhaust	1.4	0.9
Total	7,680-8,135	117-119
Water	13	1

Note1: Emission amounts in 1997 are presented using WHO-TEF(1998) as a toxicity equivalency coefficient, and emission amounts in 2018 are presented using WHO-TEF(2006) to the possible extent.

Note 2: “Water” in the table means amount released into water as part of releases.

Note 3: The number “0” in the table is the consequence of rounding up at decimals and standardized at g-TEQ.

(2) Effectiveness evaluation of the laws and policies concerning release control

A) Overall system of the laws and policies

In Japan, regulatory measures were started in 1997 to control releases of dioxins from waste incinerators and electric steel-making furnaces under the Air Pollution Control Law and the Waste Management Law. Subsequently, the target facilities subject to regulation have been expanded under the Dioxins Law. The institutional framework was put in place for enforcing comprehensive measures including the establishment of environmental quality standards, monitoring trends of environmental pollution, establishing Plans of Measures Against Soil Contamination by Dioxins and a plan for reducing the release of dioxins.

Environmental quality standards

Media	Standard
The ambient air	Not more than 0.6 pg-TEQ/m^3
The waters (excluding the bottom sediment)	Not more than 1 pg-TEQ/L
The bottom sediment	Not more than 150 pg-TEQ/g
The soil	Not more than 1,000 pg-TEQ/g

Note:

* The standards are in 2, 3, 7, 8-TeCDD toxicity equivalent
* The standards for the ambient air and the waters (excluding bottom sediment) are on an annual average basis.

As for measures to control releases, the national government specifies the facilities subject to the regulation, according to the amount released, the concentration of dioxins released, etc. When fixing the release standards it shall take into account feasible technical levels and scale of facilities etc. Waste incinerators are also subject to more stringent controls than Dioxins Law on the release of dioxins in accordance with the standards for the structure and maintenance/management of incinerators set forth under the Waste Management Law.

Under the Dioxins Law, any person installing facilities shall at least once a year measure the status of dioxins pollution caused by gases and water released from the facilities, and shall report to the Prefectural Governor.

Emission standards

(Unit: ng-TEQ/Nm^3)

Type of Specified Facilities	Scale of facilities (Capacity of incineration)	Standards for new facilities	Standards for existing facilities
Waste incinerators (hearth area is more than 0.5 m^2 or capacity of Incineration is more than 50 kg/h)	More than 4t/h	0.1	1
	2t/h-4t/h	1	5
	Below 2t/h	5	10
Electric steel-making furnaces		0.5	5
Sintering facilities for steel industry		0.1	1
Facilities for recovering zinc		1	10
Facilities for manufacturing aluminum base alloy		1	5

Note: Regarding newly constructed waste incinerators (capacity is more than 200kg/h) and electric steel-making furnaces to which the standards for controlling designated materials in the Air Pollutions Control Law have already applied, emission standards in the above chart for a new facility are applied.

Effluents

Specified Facilities and Emission Standards

(Unit: pg-TEQ/L)

Type of Specified Facilities	Emission Standard
- Bleaching facilities using chlorine or chlorine compounds used for manufacturing sulfate pulps (kraft pulps) or sulfite pulps - Cleansing facilities for acetylene used for manufacturing acetylene by carbide method - Cleansing facilities for waste gas used for manufacturing potassium sulfate - Cleansing facilities for waste gas used for manufacturing alumina fiber - Waste gas cleaning facilities, among facilities to dispose of gas generated from baking furnace used for manufacturing supported catalysts (limited to the manufacture with the use of chlorine or its compounds) - Cleansing facilities for dichloroethane used for manufacturing vinyl chloride monomer - Sulfuric acid concentration facilities, cyclohexane separation facilities, and waste gas cleansing facilities used for manufacturing caprolactam (limited to using nitrosyl chloride) - Water washing facilities and waste gas cleansing facilities used for manufacturing chlorobenzene or dichlorobenzene - Filtering facilities, drying facilities, and waste gas cleansing facilities used for manufacturing sodium hydrogen 4-chlorophthalate - Filtering facilities and waste gas cleansing facilities for waste gas used for manufacturing 2,3-dichloro-1,4-naphthoquinone - Nitro-derivative and its reductant separation facilities, nitro-derivative, its reductant cleansing facilities, dioxazineviolet cleansing facilities, and hot-air drying facilities used for	10

manufacturing dioxazineviolet - Waste gas cleansing facilities and wet dust collecting facilities among facilities disposing of exhaust fumes from roasting furnaces, melting furnaces, or dry kilns used for manufacturing aluminum or aluminum base alloy - Refining facilities, waste gas cleansing facilities and wet dust collecting facilities used for recovering zinc (limited to zinc collection from dust that is generated from electric steel-making furnaces and collected by dust-collector) - Filtering facilities, refining facilities and waste gas cleansing facilities used for metal collection from supported catalysts (spent ones only) (except collection from roasting furnaces treatment with soda ash addition and extraction with alkali (limited to processes which not use roasting furnaces treatment)) - Cleansing facilities for waste gas, wet dust collecting facilities, and ash storing facilities discharging polluted water or wastewater, which are related to waste incinerators (hearth area is more than 0.5 m^2 or capacity of incineration 50 kg/h) - Resolving facilities for waste PCB or PCB-processed matter, and cleansing facilities and sorting facilities for PCB-contaminated matter or PCB-processed matter - Plasma reactive facilities, waste gas cleansing facilities and wet dust collecting facilities used for freons (CFC and HCFC) destruction (limited to plasma reaction method, waste mixed burning method, in liquid combustion method and steam heating reaction method) - Facilities for disposing water discharged from facilities subject to effluent standards - Terminal treatment facilities of sewerage relating to facilities mentioned above	

Note: The standard relating to water discharged from terminal waste disposal facilities is 10 pg-TEQ/L based on orders stipulating standards for maintenance based on the Waste Management Law.

Under the Dioxins Law, Prefectural Governors shall monitor from time to time the level of pollution of ambient air, public water, bottom sediment and soil caused by dioxins.

With respect to measures against contaminated soil, an institutional framework is already in place whereby the Prefectural Governors shall designate the controlled areas against soil contamination by dioxins; shall establish Plans of Measures; and, shall implement operations including the removal of soil contamination in cooperation with stakeholders at the expense of polluters etc. under the Plans of Measures.

Furthermore, with respect to polluted bottom sediments, counter-measures including the removal of such pollution etc. or studies on them are undertaken in accordance with the Guideline concerning the Treatment and Disposal of Bottom Sediment issued by the Ministry of the Environment. Financial support is provided to the relevant local public authorities to appropriately promote the dismantling of general waste incinerators at the time of decommission, and encourage the effective reuse of vacant lots.

The central government provides financial assistance to local public authorities to facilitate the dismantling conducted along with facilities improvement at such sites to promote the dismantling of general waste incinerators at the time of their decommission, and encourage

the effective re-use of such sites.

Furthermore, in the following areas the national government shall establish the Reduction Plan in order to ensure the comprehensive and integrated implementation of various release reduction measures within the above-mentioned institutional framework of the laws and policies concerning dioxins:

(a) Reduction targets relating to the estimated amount of dioxins emissions categorized by field of business activities in Japan
(b) Measures for businesses in order to achieve reduction targets provided in the preceding item.
(c) Measures to be taken by the national government and local public authorities to promote the recycling and reuse of resources, and to reduce waste which could form dioxins.
(d) Other matters to reduce dioxins resulting from business activities in Japan.

The following is an overview of the third Reduction Plan as modified in August, 2012:

As regards (a) above, the aggregate reduction target set on each business field shall be 176 g-TEQ per annum in the immediate future after 2012.

The measures to be taken by business entities in connection with (b) above are as follows:

(i) Compliance with emission standards etc.

Compliance with emission standard for the emission gas and effluent standard for the effluent water etc.; prevention of environmental pollution caused by dioxins; measures in case of accidents; measurements on the status of pollution by dioxins; appointment of pollution control supervisors etc.; and, prohibition of open burning of waste.

(ii) Report dioxins releases etc. by businesses

Report of release etc. of designated chemical substances etc. in compliance with the PRTR Law, formulation of operational guidelines, taking note of the Chemical Substance Management Guidelines, implementation of release reduction measures such as checkup and improvement of the facilities, and enhancement of the general public's awareness of the measures.

(iii) Promotion of reducing, reuse and recycling waste that could form dioxins.

Measures to be taken by the government and local public authorities in conjunction with (c) above:

(i) Promotion of measures to reduce the amounts of waste etc.

Promotion of measures under the "Fundamental Law for Establishing a Sound

Material-Cycle Society" (Law No. 110 of 2000), the Waste Management Law etc. and assistance to equipment investment required for waste reduction

(ii) Achievement of reduction targets for waste etc.

(iii) Others

Reduction and proper disposal of wastes etc. from public facilities; enhancing environmental education/learning

As regards (d) above:

(i) Appropriate and smooth implementation of the Stockholm Convention

(ii) Promotion of measures for sources of dioxins

Promotion of measures against waste; promotion of measures against unregulated sources etc.; prohibition of open burning without using a proper incinerator

(iii) Report dioxins releases etc.

Publication of release inventory of dioxins; implementation of monitoring and surveys on the actual status of dioxins releases and implementation of measures based on the results; and, promotion of effective and efficient measurements and QA/QC.

(iv) Promotion of research and investigations and technological development activities regarding dioxins

(v) Publication of accurate information and enhancement of disclosure to the general public enhancement of publication and disclosure of information; and, systematic activities designed to enhance public awareness.

(For details refer to the annexed Reduction Plan)

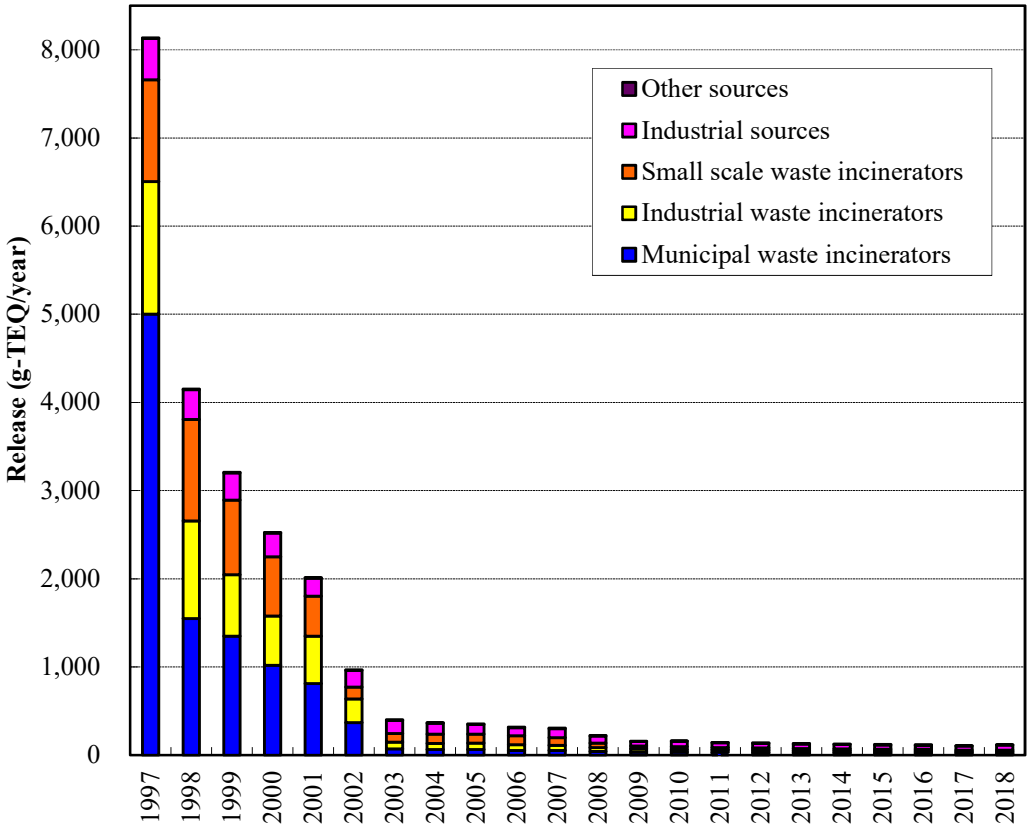
B) Assessing the effectiveness of laws and policies

As a result of the measures taken so far, releases of dioxins are estimated to have been reduced by approximately 98.5-98.6% in 2018 from the level in 1997, and this is well below the target established by the third Reduction Plan (the reduction target: 176 g-TEQ/year).

As is clear from this, Japan has continued to take measures to reduce releases of dioxins at a realistic and meaningful level as provided for in Article 5 of the Stockholm Convention.

Article 5 of the Convention stipulates that the Parties shall promote the use of the best available techniques (BAT) and best environmental practices (BEP) (hereafter referred to as the BAT and BEP guidelines), and that the Conference of the Parties shall adopt the general

guidance to be taken into consideration when applying BAT and BEP. At the third Meeting of the Conference of the Parties of the Stockholm Convention held in May 2007, the guidelines and guidance were adopted, which is to be taken into consideration when applying BAT and BEP. As a result, Japan has been requiring or promoting the use of BAT and BEP, while taking into consideration the BAT and BEP guidelines. Japan will continue to make such efforts.



(3) Strategy to promote the reduction of total releases

A) Promotion of Reduction Plan

Because dioxins are unintentionally produced when burning materials, it is important that continued measures should be taken to reduce releases. Therefore, Japan will continue to steadily take the measures incorporated into the third Reduction Plan completed in August, 2012 toward achieving the goal established by the plan.

B) Use of BAT and BEP

Under Article 5 of the Stockholm Convention, Japan will continue to take measures for reducing releases through the use of BAT and BEP for each source category provided for in

Annex C of the Stockholm Convention, taking into consideration the draft BAT and BEP guidelines, with a view to achieving the goal of continuing to minimize the release of dioxins, and where feasible, their elimination.

(A) Source categories in Part II of Annex C of the Stockholm Convention

(A-1) Measures taken and status of amounts of releases etc.

The measures taken and amounts of releases etc. related to each individual source category are as follows. Among the source categories mentioned in Part II in Annex C of the Stockholm Convention, both new and existing sources other than those related to secondary copper production are subject to legal regulations according to the amount released.

(a) Waste incinerators

(Measures taken)

- With respect to emission gas from waste incinerators with a hearth area of 0.5 m^2 or more, or with an incineration capacity of 50 kg/h or more, the emission standard is established under the Dioxins Law according to the size of an incinerator or depending upon whether an incinerator is a newly constructed one or an existing one. The emission standard is supposed to be established at a level that is attainable when technically feasible measures are taken. The emission standard for newly constructed large-scale incinerators (with an incineration capacity of 4,000 kg/h or more) is 0.1 ng-TEQ/m^3N. Cement kilns combusting waste regulated under the Waste Management Law are also regulated as waste incinerators under the Dioxin Regulation Act. The effluent standard (10 pg-TEQ/L) is set for effluent from the business establishments having cleansing facilities for waste gas, wet dust collecting facilities, and ash storing facilities discharging polluted water or wastewater, which are related to waste incinerators.
- In addition, the treatment standard for controlling the generation of dioxins is set forth under the Waste Management Law for all waste incinerators including those with an incineration capacity of below 50 kg/h. For an incinerator with an incineration capacity of 200 kg/h or more, a more detailed standard is set forth with respect to its structural and maintenance/management requirements with a view to controlling the generation and the release of dioxins.

(Amounts of releases etc.)

- As of the end of March 2019 there were 7,793 waste incinerators subject to the emission standard under the Dioxins Law and 2,484 specified facilities subject to the

effluent standard which were related to waste incinerators. The amounts of releases of dioxins from waste incinerators in 2018 is estimated to be 56 g-TEQ per annum, of which amounts of releases into waters are estimated to be 0.37 g-TEQ per annum.

(b) Production of pulp
(Measures taken)

- For wastewater discharged from bleaching facilities using chlorine or chlorine compounds used for manufacturing sulfate pulps (kraft pulps) or sulfite pulps, the effluent standard (10 pg-TEQ/L) is set forth under the Dioxins Law and it actually meets the APL.

(Amounts of releases etc.)

- As of the end of March 2019, there were 70 specified facilities subject to the effluent standard under the Dioxins Law. The amounts of releases of dioxins into waters from pulp production plants are estimated to be 0.14 g-TEQ per annum in 2018.

(c) Sinter plants in the iron and steel industry
(Measures taken)

- For sinter plants in the iron industry, the emission standard is set forth under the Dioxins Law, depending upon whether the plant is a new one or an existing one. The emission standard for new ones is set at 0.1 ng-TEQ/m^3N, which meets the APL.

(Amounts of releases etc.)

- As of the end of March 2019, there were 31 specified facilities under the Dioxins Law. The amounts of releases of dioxins from sinter plants are estimated to be 11.5 g-TEQ per annum in 2018.

(d) Secondary aluminum production (Manufacturing aluminum base alloy)
(Measures taken)

- For facilities for manufacturing aluminum base alloy in Japan which are equivalent to secondary aluminum production facilities in the metallurgical industry in Part II of Annex C of the Stockholm Convention the emission standard is set forth under the Dioxins Law, depending upon whether the plant is a new one or an existing one. The release standard for new ones is set at 1 ng-TEQ/m^3N, which does not meet the APL. The effluent standard (10 pg-TEQ/L) is set forth for effluent from the business establishments having cleansing facilities for waste gas and wet dust collecting facilities relating to roasting furnaces, melting furnaces, or dry kilns for manufacturing aluminum or aluminum base alloy.

(Amounts of releases etc.)

- As of the end of March 2019, there were 740 specified facilities subject to the emission standard under the Dioxins Law and 69 specified facilities subject to the effluent standard. The amount of releases of dioxins from facilities for manufacturing aluminum base alloy in 2018 are estimated to be 9.7 g-TEQ per annum, of which releases into waters are estimated to be 0.011 g-TEQ per annum.

(e) Secondary zinc production (Facilities for recovering zinc)

(Measures taken)

- For facilities for recovering zinc in Japan which are equivalent to facilities for secondary zinc production in the metallurgical industry in Part II of Annex C of the Stockholm Convention, the emission standard is set forth under the Dioxins Law, depending upon whether a plant is a new one or an existing one. The emission gas standard for new ones is set at 1 ng-TEQ/m^3N, which does not meet the APL. The effluent standard (10 pg-TEQ/L) is set forth for effluent from the business establishments having refining facilities, waste gas cleansing facilities, and wet dust collecting facilities used for recovering zinc.

(Amounts of releases etc.)

- As of the end of March 2019, there were 31 specified facilities subject to the emission standard under the Dioxins Law and 50 specified facilities subject to the effluent standard. The amounts of releases of dioxins from facilities for recovering zinc are estimated to be 1.7 g-TEQ per annum, of which amounts of releases into waters are estimated to be 0.0003 g-TEQ per annum.

(f) Secondary copper production (Facilities for recovering copper)

- There is one copper recovery plant in Japan that is corresponding to the criteria of facilities for secondary copper production in the metallurgical industry in Part II of Annex C of the Stockholm Convention. There is no likelihood that a new plant will be constructed for the time being. As a result, it is predicted that the level of scrap copper treatment in the facilities for recovering copper in Japan will remain flat or tend to decline. Therefore, no release control is actually being implemented under the Dioxins Law.

(A-2) Policies on future measures

Article 5(d) of the Stockholm Convention requires the use of best available techniques (BAT) and best environmental practices (BEP) for sources that fall within the purview of the

above-mentioned sources (except facilities for recovering copper mentioned in (f) above). For these sources, BAT and BEP shall be promoted continuously, taking into account the BAT and BEP guidelines etc.

Also, continued efforts will be made to provide tax and financial incentives with a view to facilitating the replacement of facilities and measures for reducing releases.

(B) Source categories in Part III of Annex C of the Stockholm Convention

(B-1) Measures taken and status of amounts of releases etc.

The measures taken and amounts of releases related to each individual source category are as follows. Measures including regulatory framework have been already been put in place for some of source categories in Part II of Annex C of the Stockholm Convention.

(a) Open burning of waste
(Measures taken)

- As the rule, the open burning of waste is prohibited under the Waste Management Law and the Offensive Odor Control Law (Law No. 91 of 1971)

(b) Thermal processes in the metallurgical industry not in Part II of Annex C of the Stockholm Convention
(Measures taken)

- For an electric steel-making furnaces for secondary steel production, the emission standard is set forth under the Dioxins Law, depending upon whether the furnace is a new one or an existing one. The emission standard for new ones is set at 0.5 ng-TEQ/m^3N.

(Amounts of releases etc.)

- As of the end of March 2019, there were 95 specified facilities subject to the emission standard under the Dioxins Law. The amounts of releases of dioxins from electric steel-making furnaces are estimated to be 28.7 g-TEQ per annum in 2018.

(c) Specific chemical production processes
(Measures taken)

- Effluent from the business establishments having facilities used for the production of each of the following chemicals is subject to the effluent standard (10 pg-TEQ/L) set forth under the Dioxins Law.
    - Vinyl chloride monomer (Dichloroethane cleansing facilities)
    - Caprolactam (limited to using nitrosyl chloride) (Sulfuric acid concentration facilities, cyclohexane separation facilities, and waste gas cleansing facilities)

- Chlorobenzene or dichlorobenzene (water washing facilities and waste gas cleansing facilities)
- Sodium hydrogen 4-chlorophthlate (Filtering facilities, drying facilities, and waste gas cleansing facilities)
- 2,3-dichloro-1,4-naphthoquinone (Filtering facilities and waste gas cleansing facilities)
- Dioxazineviolet (Nitro-derivative and its reductant separation facilities, nitro-derivative and its reductant cleansing facilities, dioxazineviolet cleansing facilities, and hot-air drying facilities)
- Potassium sulfate (Waste gas cleansing facilities)
- Acetylene by carbide method (Acetylene cleansing facilities)

(Amounts of releases etc.)

- As of the end of March 2019, there were 96 specified facilities subject to the effluent standard under the Dioxins Law. The amounts of releases of dioxins into waters from facilities for the production of these chemicals are estimated to be 0.259 g-TEQ per annum in 2018. Although these facilities are not subject to the emission standard, amounts of dioxins released into the air would be estimated to be 0.431 g-TEQ per annum if amounts released from these facilities were included in the calculation.

(d) Crematoria
(Measures taken)

- For crematorium in March 2000 “The Guidelines for Counter-measures for Reducing the Generation of Dioxins from Crematoria” was prepared and widely publicized. Now, measures are taken to reduce the release of dioxins for the facilities and their management/operation.

(Amounts of releases etc.)

- The amounts of releases of dioxins from crematoria are estimated to be 1.4-3.4 g-TEQ per annum.

(e) Motor vehicles
(Measures taken)

- Gasoline-powered motor vehicles are subject to fuel regulation under the Air Pollution Control Law, which prohibits the use of leaded gasoline.
- For diesel engine motor vehicles, regulations concerning particulate matters have been implemented since October 1993, and enhanced gradually. New long-term regulations

entered into force in October 2009, and since then, the standard for motor vehicle waste gas emission control concerning particulate matters has been further enhanced. Subsequently, every diesel engine motor vehicle is to be equipped with a diesel particulate filter (DPF).

(Amounts of releases etc.)

- The amounts of releases of dioxins from motor vehicles are estimated to be 0.94 g-TEQ per annum.

(f) Shredder plants for the treatment of end-of-life vehicles
(Measures taken)

- Under the Law for the Recycling of End-of-Life Vehicles (Law No. 87 of 2002), measures for reducing waste relating to end-of-life motor vehicles are facilitated.

(B-2) Policies on future measures

In compliance with Article 5(e) of the Stockholm Convention, Japan will promote the use of BAT and BEP, taking into consideration the BAT and BEP guidelines.

Because sufficient information on the source categories in Annex C of the Stockholm Convention is not available, it will make systematic efforts to collect data on amounts of releases etc., and examine the prioritization of measures and their technical feasibility etc., and the necessary measures shall be taken based upon the results of those studies.

(4) Measures to promote educational and training activities, and to enhance public awareness

The following measures will be taken under the Reduction Plan to promote educational and training activities, and to enhance public awareness:

- A wide range of integrated environmental education/learning, designed for promoting the reduction of waste etc., including controlling waste discharges and promoting recycling, and exchanges of personnel and information between the public sector and the private sector will be promoted under the Fundamental Law for Establishing a Sound Material-Cycle Society. Infrastructure building will be promoted to enhance the supply and the diffusion of information, personnel training, and further systematization of educational programs, in order to ensure that environmental education/learning including that designed to reduce waste discharges will be promoted at schools, within the family, in workplaces, in local communities, and any other places etc. under the Law for Enhancing Motivation on Environmental Conservation and Promoting of Environmental Education (Law No. 130 of 2003).

- Systematic training shall be provided to technical experts working in official testing organizations of local public authorities etc. to help them enhance their understanding of analytical techniques and their skills for using the technologies.
- To ensure people's better understanding and their more cooperation in addressing issues of dioxins, the government will intensify its unified and systematic public awareness activities such as preparing an inter-ministerial pamphlet, and issuing an annual report, which will enlighten the general public on the current situation and future agendas in national efforts toward the goal of building a recycling and reuse-oriented society, with the objective of disclosing and publishing to the public, in a prompt and easily understandable manner, accurate information concerning the impacts of dioxins on human health and the environment, the results of research and development, and international trends, including relevant statistical data and their actual implications.

Furthermore, the government will make best efforts to provide accurate information on dioxins through its periodicals, the internet, and mass media etc. The government will also take every opportunity to encourage the public to review their senses of value and lifestyles and shift them to generate and discharge less waste.

(5) Contribution to international community

Japan will make its due contribution in terms of transferring its knowledge, experience, and technology on measures against dioxins and waste management by meeting requests from developing countries and from countries with economies in transition.

(6) Evaluation and revision of action plan

Based on the trend etc. of amounts of releases of dioxins, the government will evaluate the implementation of the action plan every five years, and will revise the action plan if necessary.

(7) Schedule for implementing the action plan

The various existing measures for reducing releases shall be implemented adequately so that the current environmental status will not be exacerbated.

2. Hexachlorobenzene (HCB)

(1) HCB release in Japan

The current estimated amounts of HCB domestic emissions (as of 2018) are shown in the table below. As a reference, values reported at the start of estimation in 2002 are also presented.

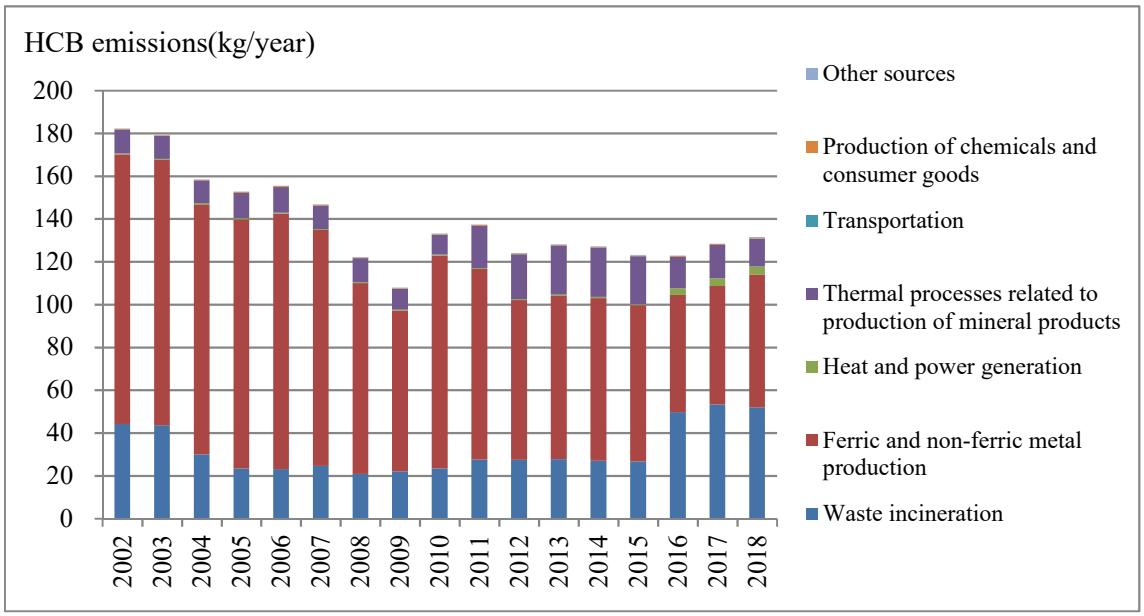
Source of emission			Emission (kg/year) (Estimates)	
			2002	2018
Part II Source categories			85	78
	Waste incinerators		44 (Water) 0.061	52
	Cement kilns		11	13
	Production of pulp		0.080 (Water) 0.080	NO
	Thermal processes in the metallurgical industry		30	13
		Secondary copper production	NO	NO
		Sinter plants in the iron and steel industry	16	4.4
		Secondary aluminum production	3.0	2.0
		Secondary zinc production	11	6.7
Part III Source categories			100	53
	Thermal processes in the metallurgical industry not mentioned in Part II		100	48
	Fossil fuel-fired utility and industrial boilers		0.38	0.29
	Firing installations for wood and other biomass fuels		0.034	3.4
	Specific chemical production processes		0.24	0.23
	Crematoria		0.16	0.17
	Motor vehicles		NE	0.047
	Smoldering of copper cables		0.42	0.37
Other source categories			1.9	1.3
Total			190	132

NE: Not Estimated NO: Not Occurring

Note 1: “Water” means amount released into water as part of releases.

Note 2: The total figure is not compatible with the sum of figures in each column due to rounding.

Note 3: HCB emission estimation was made using emission factors calculated based on measured data obtained from domestic sampling survey.



HCB emissions variation

According to surveys conducted for domestic operating facilities, HCB produced unintentionally was generated from thermal and combustion processes similar to those of dioxins. HCB releases from thermal processes in the metallurgical industry, waste incinerators and cement combustion furnaces were relatively higher than other sources, with emission rates of 46%, 39% and 9.8%, respectively.

It was estimated that HCB emission decreased between 2002 and 2008, and after 2008, it has been stagnating. Furthermore, estimations showed a 30% emission decrease in 2018 compared to 2002.

(2) Measures to reduce HCB release

It is assumed that HCB is produced via thermal and combustion processes similar to those of dioxins. Accordingly, it is expected that generation/exhaust gas control measures similar to release reduction measures for dioxins would be effective. Efforts will continuously be made to reduce HCB releases through measures stipulated in the dioxins reduction plan mentioned in Section 4.1, considering the size and number of targeted emission sources facilities. Particularly, analysis results showed that exhaust gas cooling and activated carbon adsorption could be effective, and some cases showed an HCB emission reduction resulting not only from improvement in exhaust gas treatment facilities, but also from improvement in operation and raw material management. As a consequence of this former experience, surveys in domestic operating facilities will continue to be conducted with a focus on HCB major sources. Also, efficiency of HCB emission reduction by implementation of dioxins release

reduction measures considering the BAT and BEP guidelines will be confirmed.

Moreover, as HCB release data will be maintained, efforts to promote additional measures will be made based on the survey results, such as dissemination and awareness raising through provision of useful information to operators regarding release reduction.

3. Polychlorinated biphenyls (PCBs)

(1) PCB release in Japan

The current estimated amounts of PCB domestic emissions (as of 2018) are shown in the table below. As a reference, values reported at the start of estimation in 2002are also presented.

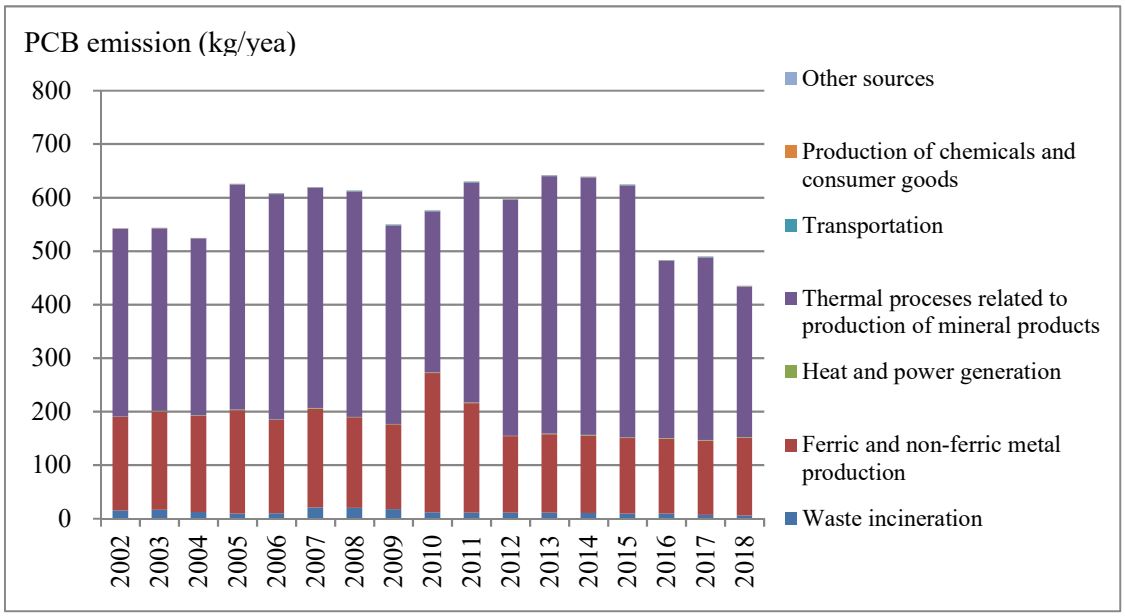
Source of emission			Emission (kg/year) (Estimates)	
			2002	2018
Part II Source categories			450	351
	Waste incinerators		15 (Water) 0.18	5.9
	Cement kilns		350	280
	Production of pulp		5.7 (Water) 5.7	NO
	Thermal processes in the metallurgical industry		82	65
		Secondary copper production	NO	NO
		Sinter plants in the iron and steel industry	45	20
		Secondary aluminum production	10	4.7
		Secondary zinc production	26	40
Part III Source categories			100	81
	Thermal processes in the metallurgical industry not mentioned in Part II		100	78
	Fossil fuel-fired utility and industrial boilers		0.84	0.88
	Firing installations for wood and other biomass fuels		0.28	0.59
	Specific chemical production processes		0.031	0.027
	Crematoria		0.44	0.47
	Motor vehicles		NE	1.0
	Smoldering of copper cables		0.084	0.074
Other source categories			5.1	3.1
Total			560	435

NE: Not Estimated NO: Not Occurring

Note 1: “Water” means amount released into water as part of releases.

Note 2: The total figure is not compatible with the sum of figures in each column due to rounding.

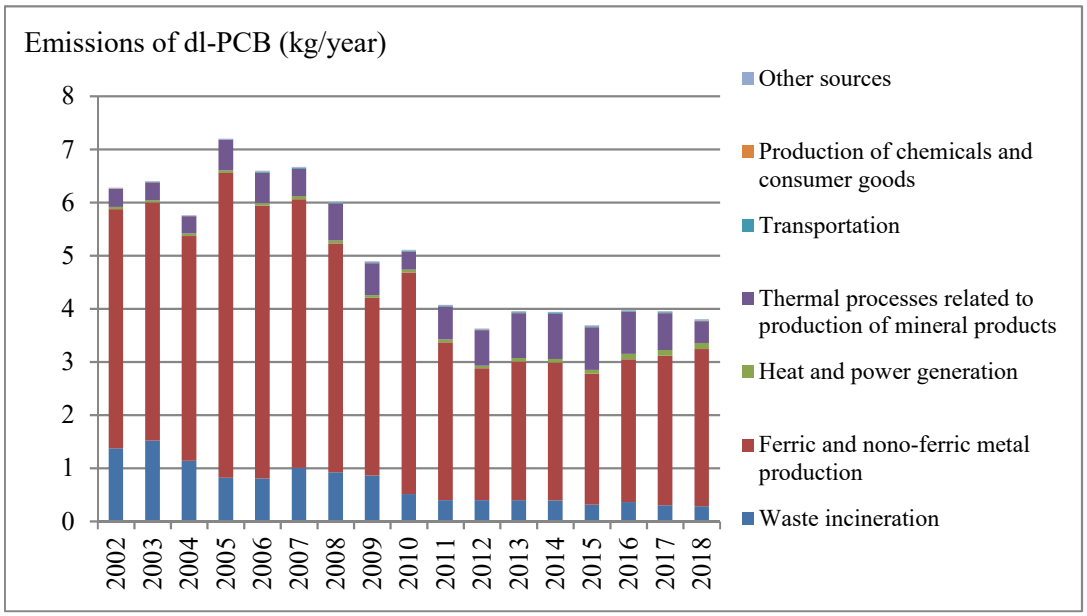
Note 3: PCB emission estimation was made using emission factors calculated based on measured data obtained from domestic sampling survey.



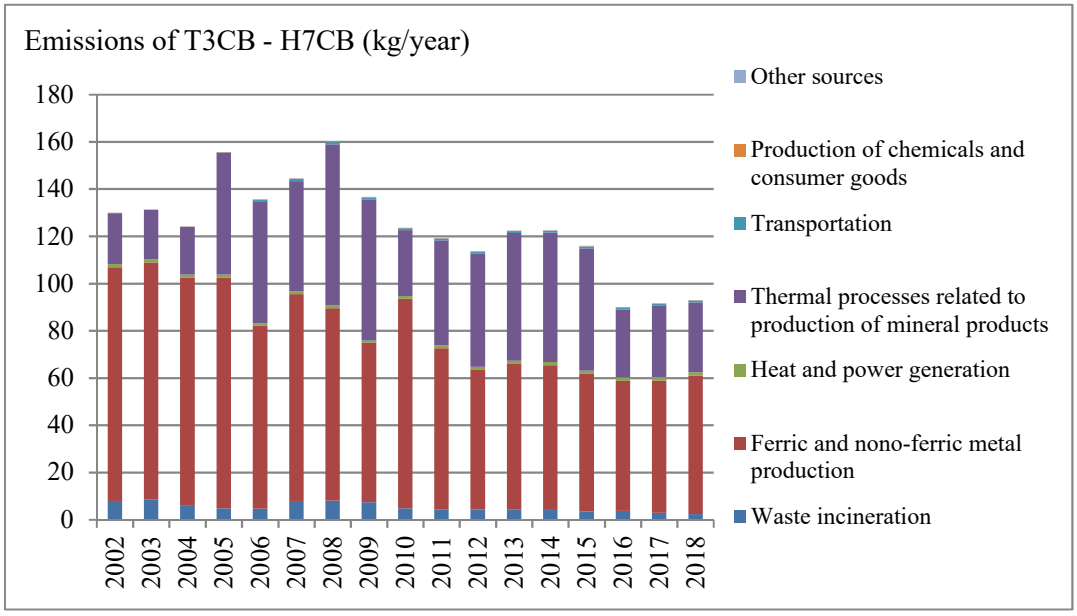
PCB emissions variation

According to surveys conducted for domestic operating facilities, unintentionally produced PCBs was generated from thermal and combustion processes similar to those of dioxins. PCB releases from thermal processes in cement combustion furnaces and metallurgical industry were relatively higher than other sources, with emission rates of 64% and 33%, respectively. Estimations showed a PCB emission decrease of 32% between 2014 and 2018, and long-term estimation between 2002 and 2018 showed a globally flat trend.

Also, PCB emissions are estimated based on the measured values of all isomers (209 kinds). Among the isomers, emissions of highly toxic dioxin-like PCBs (dl-PCB) and PCB congeners with 3 to 7 chlorine atoms (T3CB – H7CB) are estimated to be decreasing in a long-time trend.



dl-PCB emission variation



Emission variation of PCB congeners with 3 to 7 chlorine atoms (T3CB-H7CB)

(2) Measures to reduce PCB release

It is assumed that unintentionally produced PCBs are generated via thermal and combustion processes similar to those of dioxins. Therefore, it is expected that generation/exhaust gas control measures similar to release reduction measures for dioxins would be effective. Efforts will continuously be made to reduce PCB releases through measures stipulated in the dioxins reduction plan described in Section 4, 1, considering the size and

number of targeted emission sources facilities. Particularly, as analysis results showed that exhaust gas cooling and activated carbon adsorption could be effective, some cases showed a PCB emission reduction resulting not only from improvement in exhaust gas treatment facilities, but also from those in operation and raw material management. As a consequence of this former experience, surveys in domestic operating facilities will continue to be conducted with a focus on PCB major sources. Also, efficiency of PCB emission reduction by implementing dioxins release reduction measures considering the BAT and BEP guidelines will be confirmed. Moreover, emission reduction measures specific to PCB considering its generation process and emission sources will be further considered as well.

Furthermore, inventory data of PCB emission will be maintained, and based on the survey results, efforts to promote additional measures will be made such as dissemination and awareness raising through provision of useful information to operators regarding release reduction.

For emissions into public water bodies, monitoring of effluent will be continued under the Water Pollution Prevention Act, which already requires the PCB content of effluent to be below 0.003 mg/L.

4. Pentachlorobenzene (PeCB)

(1) PeCB release in Japan

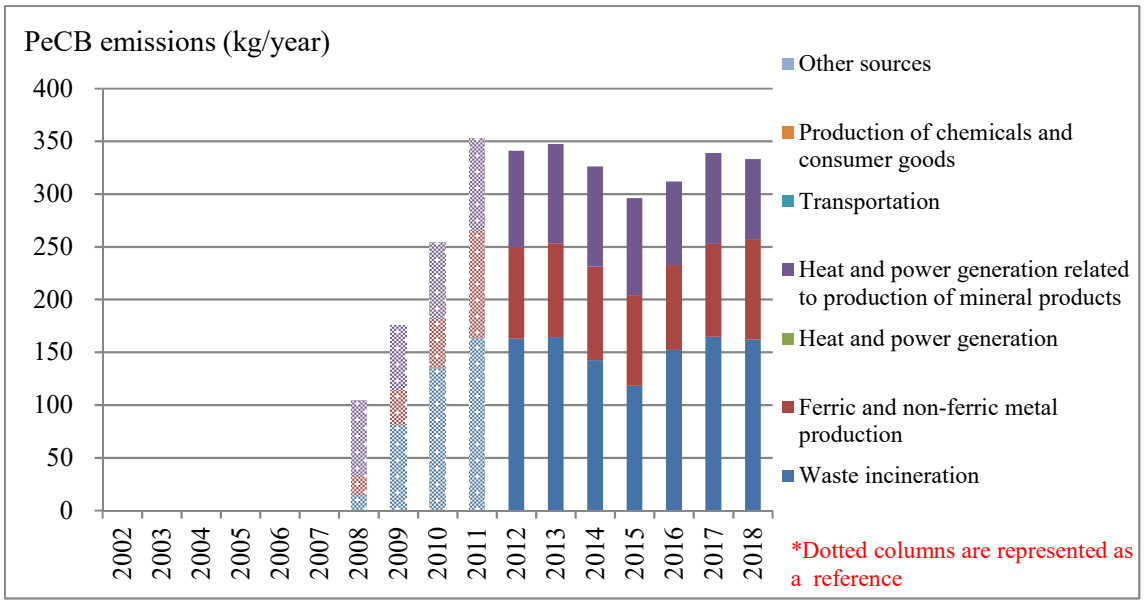
The current estimated amounts of PeCB domestic emissions (as of 2018) are shown in the table below. As a reference, values reported in 2012 when the values for PeCB emissions stabilized are also presented.

Source of emission			Emission (kg/year) (Estimates)	
			2012	2018
Part II Source categories			290	276
	Waste incinerators		163	162
	Cement kilns		91	76
	Production of pulp		NO	NO
	Thermal processes in the metallurgical industry		36	38
		Secondary copper production	NO	NO
		Sinter plants in the iron and steel industry	18	17
		Secondary aluminum production	0.56	1.8
		Secondary zinc production	18	20
Part III Source categories			51	57
	Thermal processes in the metallurgical industry not mentioned in Part II		51	57
	Fossil fuel-fired utility and industrial boilers		NE	NE
	Firing installations for wood and other biomass fuels		NE	NE
	Specific chemical production processes		NE	NE
	Crematoria		NE	NE
	Motor vehicles		NE	NE
	Smoldering of copper cables		NE	NE
Other source categories			NE	NE
Total			341	333

NE: Not Estimated NO: Not Occurring

Note 1: The total figure is not compatible with the sum of figures in each column due to rounding.

Note 2: PeCB emission estimation was made using emission factors calculated based on measured data obtained from domestic sampling survey.



PeCB emissions variation

According to surveys conducted for domestic operating facilities, unintentionally produced PeCB was generated from thermal and combustion processes similar to those of dioxins. PeCB releases from waste incinerators were relatively higher than other sources, with emission rates of 49%. After 2012, the year for which it is considered that estimated values were stabilized, estimations showed a globally flat trend.

(2) Measures to reduce PeCB release

It is assumed that PeCBs are produced via thermal and combustion processes similar to those of dioxins. Therefore, it is expected that generation/exhaust gas control measures similar to release reduction measures for dioxins would be effective. Efforts will continuously be made to reduce PeCB releases through measures stipulated in the dioxins reduction plan described in Section 4.1, considering the size and number of targeted emission sources facilities. Particularly, as analysis results showed that exhaust gas cooling and activated carbon adsorption could be effective, surveys in domestic operating facilities will continue to be conducted with a focus on PeCB major sources. Also, efficiency of PeCB emission reduction by implementing dioxins release reduction measures considering the BAT and BEP guidelines will be confirmed.

Furthermore, inventory data of PeCB emission will be maintained, and based on the survey results, efforts to promote additional measures will be made such as dissemination and awareness raising of business entities through provision of useful information to operators regarding release reduction.

5. Polychlorinated naphthalenes (PCNs)

(1) PCN release in Japan

The current estimated amounts of PCN domestic emissions (as of 2018) are shown in the table below. For the Part II Source categories, as emissions from sinter plants in the iron and steel industry were not estimated, values were presented as a reference.

Source of emission	<Reference> Emission (kg/year) (Estimates)
	2018
Part II Source categories	355
Waste incinerators	12
Cement kilns	306
Production of pulp	NO
Thermal processes in the metallurgical industry	36
Secondary copper production	NO
Sinter plants in the iron and steel industry	NE
Secondary aluminum production	3.4
Secondary zinc production	33
Part III Source categories	23
Thermal processes in the metallurgical industry not mentioned in Part II	23
Fossil fuel-fired utility and industrial boilers	NE
Firing installations for wood and other biomass fuels	NE
Specific chemical production processes	NE
Crematoria	NE
Motor vehicles	NE
Smoldering of copper cables	NE
Other source categories	0.22
Total	378

NE: Not Estimated NO: Not Occurring

Note 1: The total figure is not compatible with the sum of figures in each column due to rounding.

Note 2: PCN (limited to those containing two or more chlorine atoms) emission estimation was made using emission factors calculated based on measured data obtained from domestic sampling survey.

(2) Measures to reduce PCN release

It is assumed that unintentionally produced PCNs are generated via thermal and combustion processes similar to those of dioxins. Accordingly, concerning the PCN emissions reduction measures, it is expected that generation/exhaust gas control measures similar to

release reduction measures for dioxins would be effective. Effort will continuously be made to reduce PCN releases through measures stipulated in the dioxins reduction plan described in Section 4.1, considering the size and number of targeted emission sources facilities. Particularly, as analysis results showed that exhaust gas cooling and catalytic decomposition could be effective, surveys in domestic operating facilities will continue to be conducted with a focus on PCN major sources. Also, efficiency of PCN emission reduction by implementing dioxins release reduction measures considering the BAT and BEP guidelines will be confirmed. Moreover, emission reduction measures specific to PCNs considering its generation process and emission sources will be further considered as well.

Furthermore, a continuous survey will be conducted for source categories to maintain inventory data of PCN emission, including various source categories that were not identified this time. Based on the survey results, efforts to promote additional measures will be made such as dissemination and awareness raising of business entities through provision of useful information to operators regarding release reduction.

6. Hexachlorobutadiene (HCBD)

It is assumed that unintentionally produced HCBD is generated from chemicals production processes, in addition to thermal and combustion processes similar to those of dioxins. Accordingly, concerning the HCBD emissions reduction measures, as it is expected that generation/exhaust gas control measures similar to release reduction measures for dioxins would be effective, effort will continuously be made to reduce HCBD releases through measures stipulated in the dioxins reduction plan described in Section 4.1. Furthermore, a continuous survey will be conducted not only for thermal processes but also for various source categories related to chemicals production processes to develop inventory of HCBD emission data. Based on the survey results, efforts to promote measures will be made such as dissemination and awareness raising of business entities through provisions of useful information to operators regarding release reduction.

Section 5 Measures to eliminate polychlorinated biphenyls

1. Ban on use

An administrative guidance was issued in 1972 to voluntarily refrain from using PCB-containing devices that should not be distributed as regulated under the Stockholm Convention. In 1973, the Chemical Substances Control Law was enforced to ban the manufacture and use of PCBs, practically prohibiting the import of PCB and PCB-containing products. The Electricity Business Act (Act No. 170 of 1964) enforced in 1976 to ban the installation of electric machinery and devices using PCB-containing insulation oils on power circuit.

Among devices containing PCBs that should not be distributed as regulated under the Stockholm Convention, transformers, power condensers and some other devices are still being used. Users are required to strictly monitor and control these devices while performing appropriate inspection and maintenance.

In 2016, Act on the Partial Revision of the Law concerning Special Measures for Promotion of Proper Treatment of PCB Wastes (Law No. 34 of 2016) was enforced, and business operators who hold high-concentration PCB products (products with high concentration of PCB, as determined in paragraph 4, Article 2 of the PCB Special Measures Law, same definition will be applied hereinafter) among PCB products (PCB undiluted solution, oil containing PCBs, or products which is applied, saturated, adhered or enclosed PCBs.) should dispose the products within the treatment period, which is prior to the scheduled treatment deadline (see “2. Elimination”). If the products are electric facilities under the Electricity Utilities Industry Law, the measures are taken as required by the Law.

2. Elimination

In Japan, approximately 59,000 tons of PCBs were produced, and 54,000 tons were used domestically. The government promotes secure and proper treatment of high-concentration PCB wastes (wastes containing high concentration of PCB, as defined in paragraph 2, Article 2 of PCB Special Measures Law, the same definition will be applied hereinafter) at the wide-area waste disposal facilities with the Japan Environmental Storage & Safety Corporation (JESCO), in Kitakyushu City, Toyota City (Aichi Prefecture), Tokyo, Osaka City and Muroran City (Hokkaido). The deadlines for those who hold PCB wastes (PCB waste holders) to commission JESCO to treat PCB wastes (scheduled treatment deadline) were established, and the preparation period for end of the treatment was also established after the scheduled treatment deadline, as listed below, taking into account the generated amounts of high-concentration PCB wastes treatment which is not included in the figure in Basic Plan for Proper Treatment of

Polychlorinated Biphenyl Waste (Basic Plan), developed under the PCB Special Measures Law, equipments which could not be easily treated and the period required to prepare for the end of business. Following table is also shown in the Basic Plan.

Facilities (Place of the operation)	Type of waste	Assigned region	Wastes accepted outside assigned region	Capacity	Project period	
					Scheduled treatment deadline	Preparation period for end of treatment
Kitakyushu (1-chome Hibikimachi, Wakamatsu-ku, Kitakyushu City, Fukuoka)	Large-size transformers and capacitors	A Region	Some train-mounted transformers stored in C Region, some capacitors stored in D Region	1.5 tons/day (PCB decomposition volume)	March 31, 2019	From April 1, 2019 to March 31, 2022
	Ballasts and contaminants	A, B, and C Regions (except for wastes assigned for Osaka and Toyota Facility)		10.4 tons/day (Ballasts and contaminants volume)	March 31, 2022	From April 1, 2022 to March 31, 2024
Osaka (2-chome Hokkou-Shiratsu, Konohana-ku, Osaka City, Osaka)	Large-size transformers and capacitors	B region	Some train-mounted transformers and special capacitors stored in C Region, some special capacitors stored in E region	2.0 tons/day (PCB decomposition volume)	March 31, 2022	From April 1, 2022 to March 31, 2025
	Ballasts and contaminants	B Region (Only some small electrical equipment)			March 31, 2022	From April 1, 2022 to March 31, 2025

Toyota (3-chome Hosaya-cho, Toyota City, Aichi)	Large-size transformers and capacitors	C Region	Some of the polypropylene capacitors stored in B Region	1.6 tons/day (PCB decomposition volume)	March 31, 2023	From April 1, 2023 to March 31, 2026
	Ballasts and contaminants	C Region (only some of the small electrical equipments)			March 31, 2023	From April 1, 2023 to March 31, 2026
Tokyo (3-chome Aomi Chisaki Koutou-ku, Tokyo)	Large-size transformers and capacitors	D Region	Some train-mounted transformers stored in C Region, some large-size transformers stored in E Region	2.0 tons/day (PCB decomposition volume)	March 31, 2023	From April 1, 2023 to March 31, 2026
	Ballasts and contaminants	D Region (Only some small electrical equipment)	Powdered activated carbon waste from Kitakyushu and Osaka Facility		March 31, 2023	From April 1, 2023 to March 31, 2026
Hokkaido (Nakamachi, Muroran City, Hokkaido)	Large-size transformers and capacitors	E Region		1.8 tons/day (PCB decomposition volume)	March 31, 2023	From April 1, 2023 to March 31, 2026
	Ballasts and contaminants	D and E regions (Except for wastes assigned for Tokyo Facility)		12.2 tons/day (Ballasts and contaminants volume)	March 31, 2024	From April 1, 2024 to March 31, 2026

Note 1: Wastes types are as follow:

Large-size transformers and capacitors:

Transformers containing high concentration of PCBs and electric equipments with more

than 3kg destined to be disposed (hereinafter referred to as large-size transformers), capacitors containing high concentration of PCBs and electric instrument with more than 3kg destined to be discharged (herein after referred to as large-size capacitors), as well as PCB wastes and oil waste containing PCBs

Contaminants:

Capacitors of less than 3kg containing high concentration of PCBs (hereinafter referred to as small- size capacitors), pressure sensitive copying paper, waste cloth, sludge, and other wastes containing high concentration of PCB and that are not large-size transformers and capacitors or ballasts.

Note 2: Each region consists of the following prefectures

A Region: Tottori, Shimane, Okayama, Hiroshima, Yamaguchi, Tokushima, Kagawa, Ehime, Kochi, Fukuoka, Saga, Nagasaki, Kumamoto, Oita, Miyazaki, Kagoshima and Okinawa Prefecture

B Region: Shiga, Kyoto, Osaka, Hyogo, Nara and Wakayama Prefecture

C Region: Gifu, Shizuoka, Aichi and Mie Prefecture

D Region: Saitama, Chiba, Tokyo, and Kanagawa Prefecture

E Region: Hokkaido, Aomori, Iwate, Miyagi, Akita, Yamagata, Fukushima, Ibaraki, Tochigi, Gunma, Niigata, Toyama, Ishikawa, Fukui, Yamanashi and Nagano Prefecture

In the amendment of the PCB Special Measures Law in 2016, a “treatment period” has been set to ensure the achievement of the schedule treatment deadline. Accordingly, high-concentration PCB wastes holders must treat their wastes by themselves or entrust the treatment of the wastes to the third party within the treatment period. The last day of the treatment period was set to be a year before the each scheduled deadline. However, for the holders who satisfy certain conditions, such as the commission of the treatment of the wastes by the date one year after the last day of the treatment period (hereinafter referred to as Special treatment deadline) is ensured, treatment by themselves or the entrust of the treatment of the high-concentration PCB wastes should be done by the special treatment deadline, instead of within the treatment period.

Moreover, according to Article 14 of the PCB Special Measures Law, low-concentration PCB wastes (PCB wastes excluding the high concentration PCB wastes, same definition will be applied hereinafter) holders must treat them by themselves or entrust the treatment by 31 March 2027.

Regarding large-size transformers, large-size capacitors, ballasts, small-size capacitors and PCB contaminated wastes (limited to wastes excluding small-size capacitors. Hereinafter referred to as other PCB contaminated wastes), the treated, stored and possessed amounts as of 31 March 2019, and the generated (the total of stored amount of high-concentration PCB wastes and possessed amount of high-concentration PCB products as of 31 March 2019) and treated

amounts after the fiscal 2019 are estimated as follows.

Fiscal year	Generated amounts	Treated amounts	Stored amounts	Possessed amounts
By the end of fiscal2018	—	Large-size transformers, etc. 15,187 units Large-size capacitors, etc. 321,869 units Ballasts 2,900,000 units approximately Small-size capacitors 1,600,000 units approximately Other PCB contaminated wastes 670 tons approximately	Large-size transformers, etc. 965 units Large-size capacitors, etc. 36,206 units Ballasts 2,400,000 units approximately Small-size capacitors 1,800,000 units approximately Other PCB contaminated wastes 650 tons approximately	Large-size transformers, etc. 117 units Large-size capacitors, etc. 3,278 units Ballasts 110,000 units approximately Small-size capacitors 5,100 units approximately
After fiscal 2019	Large-size transformers, etc. 1,082 units Large-size capacitors, etc. 39,484 units Ballasts 2,500,000 units approximately Small-size capacitors 1,800,000 units approximately Other PCB contaminated wastes 650 tons approximately	Large-size transformers, etc. 1,082 units Large-size capacitors, etc. 39,484 units Ballasts 2,500,000 units Small-size capacitors 1,800,000 units approximately Other PCB contaminated wastes 650 tons approximately	—	—

Note 1: Total amounts which are stored and possessed as of end of fiscal 2018.

Note 2: Amounts in the row “By the end of fiscal 2018” are the amounts which were treated as of end of fiscal 2018.

Amounts in the row “After fiscal 2019” are the total amounts which are stored and possessed in 2018 (same for the generated amounts after fiscal 2019).

Note 3: as of 31 March 2018.

Note 4: “Other PCB contaminated wastes” include wastes with PCB concentration ranging from 5,000 mg/kg to 100,000 mg/kg.

Beside the amount shown in the table above, PCB wastes are also stored, and are expected to be sequentially treated. Even though there are obligations for the PCB waste holders to notify under the PCB Special Measures Law and the Electricity Business Act, there are still unnotified PCB wastes and products present.

The wide-area waste disposal facilities by JESCO is the only high-concentration PCB wastes treatment facilities in Japan, as a result of the efforts made for past 40 years. Therefore, related authorities cooperate to commission the treatment of high-concentration PCB wastes and dispose of high-concentration PCB products within the treatment period or by the special treatment deadline with the survey targeting unnotified holders of high-concentration PCB wastes and products.

A considerable number of the low-concentration PCB wastes and the low-concentration PCB products (PCB products other than the high-concentration PCB products) are considered to be present, including the products in use. As of end of March 2016, approximately 1.2 million units, 1 million units and 1,400 km of electrical equipments (other than pole transformers), pole transformers and oil-filled cables, respectively, are estimated to be present. Besides, in many cases, analysis of PCBs is needed to confirm whether or not it is low-concentration PCB wastes/products. The overall picture of low-concentration PCB wastes or products are to be clarified, and the strategies are to be discussed.

Moreover, as for the burnable contaminated wastes including film coating of bridges, pressure sensitive printing papers and sludge, some of them have a PCB concentration of around 100,000 mg/kg, exceeding 5,000 mg/kg, and a large amount of these could potentially be generated. According to continuous studies, as wastes which require a treatment could increase, combustion verification tests have been conducted to prepare for building a treatment system for burnable contaminated wastes with a PCB concentration exceeding 5,000 mg/kg and up to around 100,000 mg/kg. Based on the results of the studies, these wastes were added as to be treated by certificated facilities by the detoxifying certification policy, in December 2019. Accordingly, burnable contaminated wastes of a PCB concentration ranging from 5,000 mg/kg to 100,000 mg/kg are defined as low-concentration PCB wastes.

Also, regarding pole transformers which the electric power companies own by their own, they have developed the treatment facilities of their own with permission by prefectural and city governments (prefectural governments, and city governments prescribed by Cabinet Order in the provisions of paragraph 1 of Article 24.2 of the Waste Management Law; the same shall apply hereinafter), and promote the treatments. Other low-concentration PCB wastes are planned to be treated by the certified detoxifying business contractors authorized by the Minister of the Environment or the special controlled industrial waste disposal business

contractors permitted by prefectural and city governments. As of July 2019, 33 certified detoxifying business contractors and five special controlled industrial waste disposal business contractors are approved.

The government will continuously promote safe and efficient treatment by application of a permit system by the local governments for the special controlled industrial waste disposal business under Waste Management Law, enhancement and diversification of treatment systems, and the cost reduction of the treatment.

Section 6 Strategy for identification of stockpiles and wastes, and measures for sound management and disposal

When the chemicals designated under the Stockholm Convention were brought within the purview of the Chemical Substances Control Law and the Agricultural Chemicals Regulation Act, their stockpile and waste were specified by survey of actual conditions and guidance, and they were managed appropriately. In the future, if necessary, additional survey for the appropriate management and treatment will be conducted. The identification result, the situation of management and the policy for future treatment are shown as follows.

1. Stored agricultural chemicals

In 1971, the distribution of certain organochlorinated agricultural chemicals was prohibited or restricted because of their high persistence. As detoxification methods were not established at the time, they were stored underground in ways that they did not leach into surrounding areas.

Since the Stockholm Convention was ratified in 2001, surveys were conducted to determine the management and detoxification status of these stored POPs agricultural chemicals (hereafter referred to as “stored agricultural chemicals”). The survey identified a total of approximately 4,400 tons of agricultural chemicals that had been stored underground at 168 sites nationwide. Out of the total amount, approximately 4,100 tons have been excavated and treated properly by March 2019 in accordance with the “Technical Guidance on Treatment of Agricultural Chemicals containing POPs.”

As for the remaining approximately 300 tons of the stored agricultural chemicals, environmental surveys are conducted in accordance with the “Manual for the Survey, Excavation and Related Issues regarding Agricultural Chemicals Stored Underground” to prevent pollution to the surrounding environment.

Survey results on status of stored agricultural chemicals

(As of March 2019) (In tons)

Prefecture	Status	Number of burial sites	Amount of stored agricultural chemicals	Amount of each stored agricultural chemical					
				BHC*	DDT	Aldrin	Dieldrin	Endrin	Unknown
Hokkaido	Buried	2	566.020	232.995	303.039	2.794	0.672	26.520	
	Disposed	2	566.020	232.995	303.039	2.794	0.672	26.520	
Iwate	Buried	1	75.300	66.000	6.500	0.300			2.500
	Disposed	1	75.300	66.000	6.500	0.300			2.500
Miyagi	Buried	1	208.145	74.452	104.408	2.269	1.416	0.504	25.096
	Disposed	1	208.145	74.452	104.408	2.269	1.416	0.504	25.096
Akita	Buried	2	176.634	149.174					27.460
	Disposed	2	176.634	149.174					27.460
Yamagata	Buried	14	154.672	134.388	14.718	3.983	0.025	1.558	
	Disposed	14	154.672	134.388	14.718	3.983	0.025	1.558	
Fukushima	Buried	1	200.000	135.000	38.000	15.000			12.000
	Disposed	1	200.000	135.000	38.000	15.000			12.000
Ibaraki	Buried	1	65.600	55.800	7.900		1.900		
	Disposed	1	65.600	55.800	7.900		1.900		
Chiba	Buried	1	6.410	6.410					
	Disposed	1	6.410	6.410					
Kanagawa	Buried	2	73.000	30.000	17.500	11.000	13.500		1.000
	Disposed	2	73.000	30.000	17.500	11.000	13.500		1.000
Yamanashi	Buried	1	6.000						6.000
	Disposed	1	6.000						6.000
Nagano	Buried	10	376.169	1.000	0.250				374.919
	Disposed	9	367.169	1.000	0.250				365.919
Shizuoka	Buried	1	39.100	17.700	15.300	3.800			2.300
	Disposed	1	39.100	17.700	15.300	3.800			2.300
Niigata	Buried	85	492.708	364.261	86.834	5.144	1.026	0.163	35.281
	Disposed	26	343.545	234.16	76.805	2.800	0.2794	0.038	29.462
Shiga	Buried	4	249.900	87.400	162.400				0.100
	Disposed	4	249.900	87.400	162.400				0.100
Wakayama	Buried	1	14.569	6.049	5.920				2.600
	Disposed	1	14.569	6.049	5.920				2.600
Tottori	Buried	19	153.414						153.414
	Disposed	1	10.665						10.665
Okayama	Buried	1	454.800	343.300	92.200				19.300
	Disposed	1	454.800	343.300	92.200				19.300
Yamaguchi	Buried	3	162.230	162.200					0.030
	Disposed	3	162.230	162.200					0.030
Ehime	Buried	1	226.271	191.998	33.569	0.242	0.250	0.212	
	Disposed	1	226.271	191.998	33.569	0.242	0.250	0.212	
Fukuoka	Buried	1	434.420						434.420
	Disposed	1	434.420						434.420
Saga	Buried	2	28.196	19.940	8.214			0.042	
	Disposed	2	28.196	19.940	8.214			0.042	

Kumamoto	Buried		2	119.900	58.949	0.604	23.766		0.065	36.516
		Disposed	2	119.900	58.949	0.604	23.766		0.065	36.516
Kagoshima	Buried		1	63.549	54.776	8.773				
		Disposed	1	63.549	54.776	8.773				
Okinawa	Buried		2	27.000	11.000	5.940	0.048		10.012	
		Disposed	2	27.000	11.000	5.940	0.048		10.012	
Total	Buried		159	4,374.007	2,202.792	912.069	68.346	18.789	39.076	1,132.936
		Disposed	81	4,073.095	2,072.691	902.040	66.002	18.042	38.951	975.368

*BHC is referred to as α-HCH, β-HCH and lindane.

2. Other agricultural chemicals

Under the Chemical Substances Evaluation Law, chlordane and heptachlor, and endosulfan were designated as Class I specified chemical substances in 1986 and 2014, respectively. Currently the production, import and use of chlordane, heptachlor and endosulfan are virtually prohibited.

As for dicofol, which was newly specified as POPs in 2019, distribution and use of agricultural chemicals containing p,p'-dicofol are prohibited under the Agricultural Chemicals Regulation Act since 2010. Under the Chemical Substances Evaluation Law, p,p'-dicofol was already designated as Class I specified chemical substance, and in addition, o,p'-dicofol is expected to be designated as Class I specified chemical substance and the production, import and use of dicofol will be virtually prohibited.

Regarding the disposal of chlordane and heptachlor, verification tests were conducted by business entities, and they are being disposed of by methods which proper disposal is confirmed. The disposal is almost coming to completion.

Regarding the disposal of endosulfan, according to surveys conducted in FY 2015, approximately 6 tons (equivalent to approximately a ton of endosulfan) was found to be stored. Verification tests were conducted by business entities, and the endosulfan is being disposed of by methods which is confirmed to dispose properly.

Regarding dicofol (p,p'-dicofol), agricultural chemicals containing p,p'-dicofol are being properly disposed of by business entities with a track record of disposal of agricultural chemicals containing POPs.

3. Dioxin-contaminated wastes

The Waste Management Law and the Dioxins Law define wastes contaminated by dioxins and sources of emission as specially controlled municipal solid wastes or specially controlled industrial wastes (hereafter referred to as specially controlled wastes).

The following table shows dioxin-contaminated wastes handled as specially controlled wastes:

Source of emission	Type of waste
Waste incinerators (firebed area of 0.5 m^2 or more or processing capacity of 50 kg/hour or more)	Dust (3ng-TEQ/g or more) Burnt residue (3 ng-TEQ/g or more) Polluted sludge (3ng-TEQ/g or more)
Electric furnace for steelmaking	Dust (3ng-TEQ/g or more)
Roasting furnaces, melting furnaces and drying furnaces for aluminum alloys	
Bleaching facilities for sulfuric or hydrochloric acid pulps	Polluted sludge (3ng-TEQ/g or more) Waste acids (100pg-TEQ/L or more) Waste alkali (100pg-TEQ/L or more)
Acetylene cleaning equipment at acetylene production facilities using the carbide method	
Waste gas cleaning equipment at potassium sulfate production facilities	
Waste gas cleaning equipment at alumina fiber production facilities	
Dichloroethane cleaning equipment at vinyl chloride monomer production facilities	
Sulfuric acid concentration equipment, cyclohexane separation equipment and waste gas cleaning facilities at caprolactam production facilities	
Water-washing equipment and waste gas cleaning equipment at chlorobenzene/dichlorobenzene production facilities	
Water-washing equipment and waste gas cleaning equipment at sodium hydrogen 4-chlorophthalate production facilities	
Filtering equipment and waste gas cleaning equipment at 2,3-dichloro-1,4-naphthoquinone production facilities	
Nitrated derivative separation equipment, its cleaning equipment, deoxidation derivative separation equipment and its cleaning equipment at dioxazine violet production facilities	
Waste gas cleaning equipment on roasting furnaces, melting furnaces, drying furnaces for aluminum production and wet dust collectors	
Waste cleaning facilities and wet dust collectors at zinc recovery facilities for steelmaking electric furnace dust collectors	
Decomposition facilities, cleaning facilities and separation for waste PCBs	
Waste gas cleaning facilities of baking furnace used to manufacture supported catalysts	
For facilities used to collect metal from supported catalysts already used, filtering facilities, distillation facilities, waste gas cleaning facilities	
Facilities used to destroy fluorocarbons, plasma reaction facilities, waste gas cleaning facilities, and wet dust collection facilities	

From April 2001, the PRTR system under the PRTR Law has started and the amount of dioxins released (to air, public water bodies, soil or landfill) or transferred (to waste or sewage) have been recorded. In FY2018, 1,514 g-TEQ of dioxins were transferred or buried in wastes, such as particulates and burnt residues nationwide.

Under this law, the amount of dioxins transferred or buried is collected annually to forward the disposal of dioxin-contaminated wastes.

The Waste Management Law sets standards on each process of storage, collection and transportation, and disposal of specially controlled wastes.

In storage, collection and transportation, dioxin-contaminated wastes must be separated from other wastes.

For reclamation or recycling, the law prescribes the dioxins concentration as follows:

- Dioxins contained in particulates, burnt residue or sludge: 3 ng-TEQ/g or less.
- Dioxins contained in waste acids and waste alkalis: 100 pg-TEQ/L or less (for recycling only; burial not permitted).

After these treatments, waste can be landfilled as municipal or industrial wastes or recycled if their dioxins concentration meets the standard.

Furthermore, the government is promoting the proper and rapid dismantlement of the disused waste incinerators, which do not meet the regulation for strengthened dioxins release, with government support intended for the dismantlement conducted along with facilities improvement at such sites.

4. Dioxin-containing agricultural chemicals

Chloronitrophene (CNP), PCP and pentachloronitrophenol (PCNB) are agricultural chemicals which were registered in the past but were found to contain dioxins. Manufacturers of these agricultural chemicals are ordered to collect those stored by farmers along with those which were at the manufacture and distribution stage, and store them under stringent control.

Of the collected agricultural chemicals, PCP and PCNB are been detoxified by the agricultural chemical manufacturers in accordance with the “Technical Guidance on Treatment of Agricultural Chemicals containing POPs.”

As for CNP, verification tests were conducted by business entities, and CNP is being disposed of by methods which is confirmed to dispose properly.

5. Industrial products containing PFOS or its salts

(1) Industrial products for which PFOS or its salts are used in the manufacture

In Japan, PFOS or its salts were designated in 2010 as Class I Specified Chemical Substance under the Chemical Substances Control Law, and their use was prohibited except for the use for manufacture of etching agent, resist for semiconductors and photographic film for industrial use.

By FY2015, it was reported that all of identified PFOS or its salts were disposed by business entities and no stock is remaining. Furthermore, based on the interviews to the industry organizations, alternation to other substances is completed for three use applications above, and no current utilization is confirmed. Accordingly, since April 2018, use of PFOS or its salts for the manufacture of products was prohibited without exception.

The "Technical Documents on Treatment of Wastes containing PFOS" was established, (issued in September 2010 and revised in March 2011), and proper disposal of these wastes are promoted.

(2) Foam extinguishing agents containing PFOS or its salts

For extinguishers, extinguishing agents for fire extinguishers and foam extinguishing agents that are produced using PFOS or its salts (hereafter referred to as 'foam extinguishing agents containing PFOS'), alternative chemicals already exist, and it is unlikely that foam extinguishing agents containing PFOS will be manufactured or imported in the future. However, large amounts have already been distributed nationwide.

According to the survey conducted by the relevant ministries, in March 2020, approximately 18 tons (amount of PFOS or its salts contained) of the foam extinguishing agents containing PFOS were identified.

Although it is desirable that the foam extinguishing agents containing PFOS will be replaced with alternative products immediately, it is extremely difficult to replace them with alternatives in the short-term given the large amounts which have already been distributed nationwide. For this reason, the technical standards and labeling matters at the time of transfer were prepared based on the Chemical Substances Control Law to enable stringent control. Also, standards based on the Fire Defense Law have been established to prevent leakage of the foam extinguishing agents containing PFOS to the exterior at the time of inspection of fire defense equipment. The relevant ministries will continue with the survey and awareness raising activities regarding stringent control.

For the disposal of foam extinguishing agents containing PFOS, "Technical

Documents on Treatment of Wastes containing PFOS" was established (Issued in September 2010 and revised in March 2011), and the proper disposal of these wastes by relevant business entities is promoted.

Survey results on foam extinguishing agents containing PFOS etc.

Prefecture	Amount (In PFOS or its salts equivalent *) Unit: kg					
	Total	Fire-fighting organizations	Airport	Self-Defense Forces facilities	Petrochemical complexes etc.	Others
Hokkaido	356.426	21.031	284.233	30.637	2.885	17.640
Aomori	306.286	2.707	0	303.579	0	0
Iwate	28.001	2.368	21.269	0	0	4.364
Miyagi	339.565	36.657	68.027	131.278	0.864	102.739
Akita	40.416	13.651	0	7.609	0	19.157
Yamagata	53.683	23.415	22.590	1.404	0	6.274
Fukushima	50.405	1.689	7.614	0	0	41.102
Ibaraki	187.231	17.602	0	58.382	13.878	97.369
Tochigi	21.955	0	0	6.300	0	15.655
Gunma	236.993	0	0	0	230.215	6.779
Saitama	435.868	35.085	0	10.334	1.405	389.045
Chiba	1192.766	657.291	20.834	71.482	166.960	276.199
Tokyo	3006.640	19.772	102.386	76.329	0	2808.153
Kanagawa	2166.574	653.753	0	372.063	18.790	1121.968
Niigata	947.040	671.369	39.145	8.649	121.018	106.859
Toyama	122.988	27.071	0	0.031	50.039	45.847
Ishikawa	383.972	1.192	0	246.960	0	135.820
Fukui	5.106	5.018	0	0	0	0.088
Yamanashi	10.802	6.915	0	0.005	0	3.882
Nagano	101.008	38.544	0	0	0	62.464
Gifu	76.677	3.336	0	3.312	0	70.029
Shizuoka	203.376	27.822	0	160.869	2.080	12.604
Aichi	1269.559	308.717	27.872	2.178	41.411	889.382
Mie	192.883	23.036	0	57.176	100.472	12.198
Shiga	46.185	1.394	0	0.052	0.811	43.928
Kyoto	287.223	0	0	227.127	0.082	60.014
Osaka	1249.404	189.325	2.902	0	744.316	312.860
Hyogo	251.198	29.749	0	0.675	26.746	194.029
Nara	22.858	1.689	0	0	0	21.169
Wakayama	12.506	0.252	0	0	0.110	12.144
Tottori	42.959	0.894	24.642	0	0	17.423
Shimane	187.158	0.873	145.862	0.861	0	39.562
Okayama	287.066	29.573	54.206	0	142.160	61.127
Hiroshima	1329.138	15.005	38.366	1042.247	26.552	206.968
Yamaguchi	226.106	59.877	47.474	60.881	43.785	14.089
Tokushima	7.283	0.382	0	6.902	0	0
Kagawa	37.284	0	34.666	0	0	2.619
Ehime	196.607	2.797	32.228	0	36.629	124.953
Kochi	99.775	0.027	75.671	0	0	24.077
Fukuoka	217.411	0.128	102.483	17.074	14.403	83.323
Saga	33.600	33.600	0	0	0	0
Nagasaki	558.601	0.420	70.217	437.653	50.312	0

Kumamoto	60.597	0	15.880	20.962	0	23.755
Oita	118.428	34.094	29.450	0.162	51.230	3.491
Miyagi	331.854	1.881	26.228	303.745	0	0
Kagoshima	125.196	7.692	76.885	8.382	27.872	4.364
Okinawa	354.918	4.215	66.403	161.204	0	123.096
Total	17819.575	3011.906	1437.533	3836.505	1915.023	7618.608

(Note)

Fire-fighting organizations: The Fire and Disaster Management Agency conducted the survey of every fire-fighting headquarters through the prefectures. As of the December 1st, 2019.

Airports: The Ministry of Land, Infrastructure, Transport and Tourism conducted the survey of government managed, local government managed and company managed airports. As of the end of December 2019.

The Self-Defense Forces facilities: The Ministry of Defense conducted the survey of the Self-Defense Forces camps, bases, ships, etc. As of the end of December 2019.

Petrochemical complexes etc.: The Ministry of Economy, Trade and Industry conducted the survey of relevant companies through industrial groups. As of the end of December 2019.

Others: The Ministry of the Environment conducted the survey to the extent possible with the help of the Japan Fire Extinguishing Systems Manufactures Association, General Incorporated Association. As of the end of January 2020. In addition, data provided by relevant ministries not categorized above is included.

* In cases where types of foam extinguishing agents were evident, conversion was conducted based on the concentration of PFOS or its salts contained in the foams. When types were unclear, conversion was conducted to the extent possible using the average concentration etc.
* These survey results are amount identified as of the survey date. There is a possibility that more foam extinguishing agents containing PFOS are identified by the survey in the future.
* Due to the change of calculation method of PFOS concentrations in foam extinguishing agents, these results cannot be compared with the results shown in prior national implementation plan.

6. Brominated flame retardants of plastics

HBB, polybromodiphenyl ethers (POP-BDEs (tetrabromodiphenyl ethers, pentabromodiphenyl ethers, hexabromodiphenyl ethers, heptabromodiphenyl ethers)), HBCDs and decabromodiphenyl ether (DecaBDE) are brominated flame retardants. These chemicals were designated as Class I Specified Chemical Substance under the Chemical Substances Control Law, and their manufacture, import and use are virtually prohibited. (HBB and POP-BDEs were designated in 2010, HBCDs were in 2014, and DecaBDE was in 2018.)

POP-BDEs have been used in cathode ray tube monitor casings, phenolic paper laminated sheet, etc. The existing main stock currently confirmed is for cathode ray tube monitor casings. When cathode ray tube monitor casings are discarded, the majority is sent to home appliance recycling plants and is dismantled manually, then crushed and recycled as recycled pellet. Japan has registered this recycling as specific exemptions to the secretariat of

the Stockholm Convention.

As for waste containing HBCDs, POP-BDEs and DecaBDE, appropriate measures to promote proper disposal are currently under consideration, foreseeing a certain amount of disposal in the future.

7. Chlorine agents

HCB and PCNs with three or more chlorines were designated as Class I specified chemical substances in 1979 under the Chemical Substances Control Law. Furthermore, HCBD, PCP or its salts or esters, and PCNs with two chlorines were designated as Class I specified chemical substances in 2016 under the same law. In addition, SCCPs with carbon chain lengths ranging from 10 to 13 and a content of chlorine exceeding 48% by weight were also designated as Class I specified chemical substances in 2018.

The status of each agent's stockpile is as below. Survey will be done to identify the details of storage, and the identified waste agents will be managed or disposed properly.

As for HCB, there is currently no stockpile excluding those from unintentional production.

As for wastes of rubber products, adhesives, etc. with PCNs used, verification tests were conducted by business entities, and wastes are being disposed of by methods which is confirmed to dispose properly.

As for HCBD, waste fluids from tetrachloroethylene and trichloroethylene production are being properly disposed by relevant business entities by methods which have been verified through verification tests done by the business entities.

As for PCP, there is no clear evidence that PCP currently remains. Collection of information will be continued and measures to promote proper disposal will be considered.

As for SCCPs, it was confirmed that SCCPs were used for resin products in automobile and wall papers. Collection of information will be continued and measures to promote proper disposal will be considered.

8. Industrial products containing PFOA, its salts and PFOA related substances

Based on the survey in FY2018, no stockpile was confirmed for PFOA, and 300 kg of PFOA salts were confirmed to remain as stockpile, however, no business entity is planned to manufacture, import or use those chemical substances after FY2020. Regarding PFOA related

substances, it is confirmed that they are used for raw material of pharmaceuticals and semiconductors. For the use in which no alternative substance is available and no harm to human health may occur, exceptional manufacture and use are expected within the extent necessary. Therefore, measures to promote proper management will be considered.

Furthermore, measures to promote proper disposal of wastes related to PFOA, its salts and PFOA related substances will also be considered.

Section 7 Strategy for Identification of contaminated sites

1. Dioxins

(1) Anti-pollution measures for soil

Dioxins have been under regular observation by local public authorities since FY2000 in accordance with the Dioxins Law. Surveys on dioxins in soil are categorized as follows to efficiently determine the state of pollution.

(i) General environmental survey

To detect dioxins concentrations in soil in the general environment, this survey is conducted without presuming specific sources.

(ii) Survey on areas surrounding sources

This survey is conducted in areas surrounding sources to understand the effects of facilities that generate and emit dioxins to soil around these sources.

(iii) Survey on target areas

This survey is carried out to determine dioxins concentrations in soil in areas that are under threat of dioxins contamination (target areas according to the result of study on available information).

If the soil is found to exceed the survey index value of 250 pg-TEQ/g in the general environment survey, the surrounding soil is analyzed for dioxins concentration. If the site exceeds the environmental quality standard for soil of 1,000 pg-TEQ/g, further survey is performed to determine the extent and depth of the contaminated soil.

Areas with dioxins levels exceeding the environmental quality standard for soil will be designated by the local public authority as the controlled areas against soil contamination in accordance with the Dioxins Law. The local public authority will then establish Plans of Measures and implement antipollution measures based on the plan, including removal and

detoxification of the soil.

By March 2018, six areas have been designated as controlled areas. Among these areas, necessary measures such as detoxification of contaminated soil have been completed for three areas, and they were delisted. As for remaining three areas, necessary measures are currently implemented.

Soil surveys for dioxin contamination and treatment of soil contaminated by dioxins require an enormous expense. Since it is necessary to reduce the costs, technological development and dissemination of its results are being addressed.

(2) Antipollution measures for bottom sediment

(i) Contamination survey on dioxins in bottom sediment

In response to the enforcement of the Dioxins Law in January 2000, an environmental standard regarding contamination of bottom sediment in public waters was set up in July 2002 and went into force in September.

In FY1998, local public authorities such as prefectures and municipalities nationwide carried out dioxins surveys on bottom sediment in public water bodies. Regular dioxins monitoring has been conducted since FY2000.

Also after FY1999, dioxins surveys to analyze the contamination of bottom sediment in public water bodies have been done continuously, and “The manual of the survey and measurement of dioxins in sediment” was published. This manual describes the methods for constant monitoring, for example, the selection of survey areas, sampling sites, and the observation and measurement items. In FY2002, dioxin surveys were conducted on ports and harbours being developed under government-sponsored projects, as well as on waterways to be developed and preserved. This aims to ensure safe, smooth implementation of dredging operations. In addition, a survey was carried out in Tokyo Bay on POPs, including dioxins, in marine sediment as part of a marine reclamation project.

(ii) Basic concept for anti-pollution measures for dioxins in bottom sediment

Antipollution measures for dioxins in bottom sediment are urgently needed, because the dioxins surveys implemented so far on bottom sediment identified a number of areas where the dioxins concentration in bottom sediment fails to meet the environmental quality standard.

If bottom sediment is found contaminated beyond the environmental quality standard, some measures must be taken. In August 2002, the government issued the “Guideline on Treatment and Disposal of Bottom Sediment.” This guideline prescribes that, in taking disposal procedures such as removal of contaminated bottom sediment, consideration should be given on

local characteristics such as the properties of the bottom sediment and the terrain, hydrographic conditions, flow conditions of the area, as well as fishing seasons and fishing conditions. The guideline also requires appropriate management and storage of records regarding surveys and engineering works performed around the area. Under this guideline it is also important to implement countermeasures against sources of emission in order to prevent further pollution.

(iii) Implementation of anti-pollution measures for dioxins in bottom sediment

(a) Rivers and lakes

To implement countermeasures against dioxins contamination in bottom sediment in rivers and lakes, the "Manual for measures against dioxins in bottom sediment in rivers and lakes" has been drafted in cooperation with academic experts. Based on this manual, anti-pollution measures are being implemented to address dioxins in bottom sediment in public water bodies.

(b) Ports and Harbours

To implement necessary measures safely and consistently against dioxins found in ports and harbours during dredging operation, the government compiled the "Technical Guidelines on Measures against Dioxins in Bottom Sediment of Ports and Harbours" in March 2003 (revised in April 2008) and the "Data Book on Dioxin Decomposition and Detoxification Technology for Bottom Sediment in Ports and Harbours" in March 2005 in cooperation with professional experts. These were distributed to relevant organizations.

Measures against dioxin in bottom sediment of ports and harbours are promoted on the basis of the Technical Guidelines and the Data Book.

2. Polychlorinated biphenyls (PCB)

(1) Antipollution measures for soil

PCB is designated as a specified hazardous chemical under the Soil Contamination Countermeasures Act. Surveys are to be conducted, for example, when facilities that manufacture, use or dispose of PCB have closed down, and the form or nature of land changes in ways that could lead to soil contamination. If the survey results reveal that standards stipulated under the law were not met, measures would be implemented including removal of contaminated soil as necessary.

(2) Antipollution measures for bottom sediment

For PCB-contaminated bottom sediment, the provisional standard value for removal is set at 10 ppm per unit of dry weight of bottom sediment. If this value is exceeded, it is obligatory to implement certain measure to remove PCB.

A nationwide survey was conducted in FY1972 on PCB-contaminated bottom sediment. A total of 79 water areas were found to require antipollution measures, including removal of PCBs. By November 2004, antipollution measures for PCB-contaminated bottom sediment were completed for all of the 79 areas.

3. Others

The Waste Management Law and the Dioxins Law require that burnt residues and dusts containing dioxins be buried in Landfill Site for Domestic Wastes and Industrial Wastes (Leachate-Controlled Type), while those exceeding the standard must be taken to Landfill Site for Hazardous Industrial Wastes (Isolated Type), in order to prevent environmental pollution.

In addition, sites where 2,4,5-T (an herbicide which contains dioxins as contaminants), were buried in an appropriate manner that prevents polluting, are managed properly.

Section 8 Countermeasures against chemical substances not listed in the Annexes of the Stockholm Convention

In Japan, regulations have been imposed on industrial chemicals and agricultural chemicals that have certain characteristics such as toxicity and long-term persistency. New chemical substances are subject to prior evaluation before they are produced or imported. Production or import permission is issued only after the inspection above is conducted. Moreover, drugs etc. are assessed before production or distribution. If they are inadequate as drugs etc., production or sale permission is not issued.

Under the Chemical Substances Control Law, new industrial chemical substances are prior reviewed for degradability, accumulation, long-term toxicity on humans and toxicity to plants and animals. If a chemical is found to be highly persistent, accumulative and possess long-term toxicity to humans or top predators, the chemical is designated as a Class I Specified Chemical Substance and is thus subject to a permission procedure for production and import. In addition, its use is restricted and subject to a notification procedure. Thus the production and import of such chemicals is virtually prohibited.

Under the Agricultural Chemicals Regulation Act, if agricultural chemicals meet the condition prescribed in each item of paragraph 1 of Article 4, registrations of those chemicals

will be refused. These conditions include fabrication of information in the registration form, when the chemical's value as an agricultural chemical is not accepted, and when the chemical may pose harm to human or livestock. In addition, if a registered agricultural chemical was found to cause damage under the condition met in item 4 to 9 or item 11 of paragraph 1 of Article 4 (e.g. when agricultural chemicals cause soil pollution and the contaminated crops may cause harm to human or livestock), the distribution shall be prohibited on the basis of the stipulation of paragraph 2 of Article 18 to prevent adverse effects on human health and environment. Moreover, the use of such agricultural chemicals can also be prohibited following Article 24. At present, it is prohibited to distribute or use agricultural chemicals containing 27 chemicals as active ingredients, including the 17 chemicals designated under the Stockholm Convention.

As for pharmaceuticals etc., item 3 of paragraph 2 of Article 14, item 3 of paragraph 2 of Article 23.2.5, and item 3 of paragraph 2 of Article 23.25 of the Pharmaceuticals and Medical Devices Law (including cases where it shall read and apply pursuant to the provisions of the Article 83) stipulates that pharmaceuticals etc. may be approved for marketing only after evaluation of their name, ingredients, composition, structure, dosage and administration, indications and usage, performance, side-effects etc. based on the toxicity, absorption and metabolism of new substances. If they are inadequate for drugs etc., production or sale permission is not issued.

Thus, in Japan, the above laws are applied to chemicals that have similar properties to those of POPs.

Section 9 Measures for monitoring POPs in the environment

(1) Summary of activities for environmental monitoring of POPs

The Ministry of the Environment established an expert group to discuss measures to be taken for environmental monitoring of chemicals designated under the Stockholm Convention. The group deliberated on how to determine the state of environmental contamination and how to evaluate the effects of measures currently being taken. The monitoring policy and monitoring method for POPs was developed utilizing high-resolution gas chromatography/high-resolution mass spectrometry. The monitoring policy and the monitoring method will be revised as necessary and the government will continue to carry out nationwide surveys on water, bottom sediment, air and wildlife for 24 groups of POPs and newly designated POPs, excluding dioxins.

Regular observation of PCBs in public waters by local public authorities will be

reinforced in accordance with the Water Pollution Prevention Act.

As for Dioxins, local public authorities implement large-scale nationwide surveys under the Dioxins Law, which also requires regular observation, in public water, bottom sediment, ambient air and soil; this survey will continue. The government will also continue to implement surveys on human biological samples.

In addition, a survey will be implemented to examine the distribution of land-derived POPs and their effects on the marine environment.

Moreover, the government will conduct environmental monitoring of the possible POPs chemicals.

More specifically, these surveys on chemicals designated under the Stockholm Convention will be carried out as follows:

(2) 26 groups of chemicals other than dioxins and newly designated chemical substances

(i) Chemicals surveyed

- PCBs (total PCBs and concentrations of congeners with 1 to 10 chlorines)
- DDTs (o,p'-DDT, p,p'-DDT, o,p'-DDE, p,p'-DDE, o,p'-DDD and p,p'-DDD)
- Chlordanes (trans-chlordane, cis-chlordane, trans-nonachlor, cis-nonachlor and oxychlordane)
- Dieldrin, aldrin, endrin, mirex
- Toxaphenes (Parlar-26, Parlar-50, Parlar-62)
- HCB
- Heptachlors (Heptachlor, cis-heptachlor epoxide, trans-heptachlor epoxide)
- HCHs (α-HCH, β-HCH, γ-HCH, δ-HCH)
- Chlordecone
- HBB
- Polybromodiphenyl ethers (number of bromine: 4 to 10)
- PFOS or its salts, PFOSF
- PeCB
- Endosulfan
- HBCDs (α-HBCD, β-HBCD, γ-HBCD, δ-HBCD, ε-HBCD)
- PCNs (total PCNs and concentrations of congeners with 1 to 8 chlorines)
- HCBD
- PCP and its salts and esters
- SCCPs (chlorinated decane, chlorinated undecane, chlorinated dodecane and chlorinated tridecane)

(Newly designated chemicals)

・ Perfluorooctanoic acid (PFOA)

・ Dicofol

(ii) Media and sites of survey (Results of FY2018 survey)

・ Water (47 sites including major rivers, major lakes, ports and harbours.)

・ Water (monitoring sites in rivers, lakes and seas under the Water Pollution Prevention Act)

・ Bottom sediment (61 sites including major rivers, major lakes, ports and harbours.)

・ Air (37 sites selected from 100-km^2 gridded area nationwide)

・ Wildlife (Total of 25 sites for sea bass, greenling, rock greenling, Okinawa seabeam, dace, blue mussel, Pacific saury, chum salmon, striped mullet and Great Cormorant)

(3) Dioxins

(i) Chemicals surveyed

PCDDs, PCDFs and coplanar PCBs

(ii) Media and sites of survey (Results of FY2018 survey)

・ Water (major rivers, major lakes, reservoirs, ports and harbours: 1,431 sites)

・ Bottom sediment (major rivers, major lakes, reservoirs, ports and harbours: 1,187 sites)

・ Air (general environment, areas surrounding sources of emission, roadsides: 619 sites)

・ Soil (general environment, areas surrounding sources of emission: 818 sites)

・ Groundwater (511 sites)

・ Human biological samples (blood)

Section 10 International measures

1. Measures in responses to the Stockholm Convention

(1) Assistance to developing countries etc.

In many cases, developing countries do not have regulatory framework for hazardous substances, which may result in environmental pollution and public health hazards. It is important that the capabilities of developing countries and countries with economies in transition to manage chemical substances be enhanced in order to eliminate or reduce releases of POPs on a global scale. Under paragraph 2 of Article 12 and paragraph 2 of Article 13 of the Stockholm Convention, Japan, as a developed country, is to provide financial and technical

assistance to the parties to the convention which are developing countries and countries with economies in transition. Japan has cooperated actively with these arrangements, taking into account the concerns and needs of these countries in the area of finance and technology.

(i) Technical cooperation

Japan has provided technical cooperation to developing countries in the field of environment management technology for the chemical industry, technology for the analysis and risk assessment of the environmental load of chemical substances, technology for the microanalysis of chemical substances etc. by dispatching experts to and receiving trainees from these countries. As regards the bilateral ODA projects, more than 150 trainees participated in "Training Course for Chemical Management Policy" as International Training and Dialogue since 2005, and "Chemical Management Policy: Reflecting International Discussion" as regional training courses for Asian countries on management and reduction of chemical substances from 2011. Also, from 2011 to 2015, international training courses for capacity building in POPs management were provided in cooperation with Brazil to 10 Latin American countries, to help them achieve the targets under the Stockholm Convention. In addition, the Project of Capacity Building for Analysis and Reduction Measures of Persistent Organic Pollutants in Serbia has started from 2014. Such cooperation will be continued upon requests from developing countries.

(ii) Financial assistance

The interim financial assistance arrangements under the Stockholm Convention are operated by the Global Environment Facility (GEF). GEF provides basically grants to developing countries and countries with economies in transition in order to cover their incremental costs in order to respond to global environmental issues. GEF has also been designated as their respective funding mechanisms in the multi-international environmental agreements aimed at reduction of environmental emission and proper management of mercury, reduction of the emission of greenhouse gases, protection of biodiversity etc. GEF also provides funding to Strategic Approach on International Chemical Management (SAICM). In the seventh replenishment of GEF (from July 2018 to June 2022), Japan has contributed 637 million dollars representing 19% of the Fund's total of 33.5 billion dollars on a pledging basis.

(iii) Regional arrangements

As a part of Japan's regional programs in the East Asia region, the Ministry of the Environment and the National Institute for Environmental Studies have held the East Asia POPs Monitoring Workshop beginning in FY2002 to build a monitoring framework to determine the

trends of POPs in the East Asia region, and to enable continuous data collection necessary for effectiveness evaluation of the Stockholm Convention.

Results of the surveys done in eight countries in the East Asia region till FY2006 were compiled in the "Asia Pacific Monitoring Report (December 2008)" which were submitted to the Secretariat of the Stockholm Convention. In addition, the result of the surveys done in six countries in the East Asia region till FY2012 was submitted as the "Second Asia Pacific Monitoring Report (March 2015)" to the Secretariat of the Stockholm Convention.

In the future, Japan, in cooperation with neighboring areas such as East Asia, will conduct POPs Monitoring providing technical assistance, and contribute to the evaluation of the effectiveness of the Stockholm Convention based on Article 16.

(2) Exchange of information

Japan exchanges information with other parties and the Secretariat of the Stockholm Convention through the Global Environment Division of the International Cooperation Bureau of the Ministry of Foreign Affairs.

2. Coordination with other related international conventions

In addition to the Stockholm Convention, the Basel Convention and the Rotterdam Convention on the Prior Informed Consent Procedures for Certain Hazardous Chemicals and Pesticides in International Trade (hereafter referred to as the PIC Convention) are also international conventions related to chemical substances management. Japan has been cooperating actively to these Conventions and recognizes that the Stockholm Convention and these Conventions in the field of trade and the environment are mutually supportive.

The Basel Convention, which aims to regulate the transboundary movement and disposal of hazardous wastes, was adopted in March 1989 and entered into force in May 1992. Japan acceded to the Convention in September 1993 and the Convention came into effect in Japan in December 1993. Paragraph 2 of Article 6 of the Stockholm Convention stipulates that the Conference of Parties to the Convention shall cooperate closely with appropriate bodies of the Basel Convention. Japan was the lead country in the update of technical guideline on the environmentally sound management of PCB wastes (adopted in the twelfth meeting of the Conference of the Parties to the Basel Convention in May 2015) which was established under the Basel Convention, as stipulated under Paragraph 1 (d) (ii) of Article 6 of the Stockholm Convention. Japan is also the lead country in the revision project to add PCN waste in the same guideline. In addition, Paragraph 1 (d) (iv) of Article 6 of the Stockholm Convention stipulates

that wastes shall not be transported across international boundaries without taking into account relevant international rules, standards and guidelines. These rules include the regulations under the Basel Convention. The Basel Convention also requires waste management in an environmentally sound manner. In Japan, the Basel Law and the Waste Management Law have been properly enforced to regulate the import and export of hazardous wastes. Wastes that contain POPs and are designated as specific hazardous wastes under the Basel Law are required to be properly managed from the perspective of the environment under the Basel Law. To publicize the scope of the Basel Convention and the regulations under the Basel Law to prevent illegal export of wastes, the government, in cooperation with Customs Offices, has organized briefing meetings on the Basel Law etc. across the country. The Ministry of the Environment and the Ministry of Economy, Trade and Industry have also conducted prior consultation services on matters relating to the export and import of hazardous wastes.

The PIC Convention stipulates prior informed consent (PIC: Prior Informed Consent) procedure for certain hazardous chemical substances and pesticides in international trade. The PIC Convention was adopted at the Diplomatic Conference held in September 1998, and entered into force in February 2004. Japan lodged with the depository instrument of acceptance in June 2004 and the PIC Convention entered into force in Japan in September 2004.

Paragraph 2 (b) of Article 3 of the Stockholm Convention stipulates that when the POPs listed in Annex A and Annex B are to be exported in accordance with their specific exemption, any relevant provisions in existing international prior informed consent instruments should be taken into account. Therefore, parties are required to take into account the PIC system as set forth in the PIC Convention etc. when they are to export in exceptional circumstances the POPs referred to in that Article.

The government will continue to actively cooperate under these Conventions related to chemical management.

Activities to enhance cooperation and coordination (synergy) among the three Conventions are occurring. For example, the Stockholm, Basel and PIC Conventions have established a joint secretariat, and the regional centers established under the Stockholm and Basel Convention are used to provide technical assistance in capacity building to enhance the ability of developing countries to implement their obligations under the three Conventions. Further cooperation and coordination among the three Conventions is expected to raise awareness of the importance of chemical substance and waste management and further promote the enhancement of the implementation of each convention. Japan will be engaged properly in international activities to strengthen synergy among the three Conventions through collaboration among the relevant ministries and agencies.

Section 11 Provision of information

1. Compilation of information

The government has taken various measures for providing information on POPs. For example, it has made efforts for raising awareness and promoting understanding of POPs issues through the provision of information on POPs such as webpage and pamphlets on POPs, as well as on dioxins and PCB (table below).

The government will continue to actively provide information on POPs.

Pamphlets and brochures	POPs - Persistent Organic Pollutants -
	Dioxins 2012 (Japanese version)
	Dioxins 2012 (English version)
	Toward the Sound Disposal of Polychlorinated Biphenyls (PCB) Containing Products and PCB Wastes Within the Designated Timeframe
Webpages	POPs ・ http://www.meti.go.jp/policy/chemical_management/int/pops.html ・ http://www.env.go.jp/chemi/pops/treaty.html
	Chemical Substances Control Law ・ http://www.nihs.go.jp/mhlw/chemical/kashin/kashin.html ・ http://www.meti.go.jp/policy/chemical_management/kasinhou/index.html ・ http://www.env.go.jp/chemi/kagaku/index.html
	Measures against Dioxins (Japanese) ・ http://www.env.go.jp/chemi/dioxin/index.html
	Polychlorinated Biphenyls Wastes ・ http://www.env.go.jp/recycle/poly/index.html

2. Consultation with stakeholders

Paragraph 2 of Article 7 stipulates that the “Parties shall, where appropriate, cooperate directly or through global, regional and subregional organizations, and consult their national stakeholders, including women’s groups and groups involved in the health of children, in order to facilitate the development, implementation and updating of their implementation plans.”

After the Interim Guidance for Developing a National Implementation Plan was presented by the United Nations Environment Programme (UNEP) and World Bank at the sixth Inter-Governmental Negotiating Committee held in June 2002, the Ministry of the Environment organized meetings to exchange opinions with NGOs etc. Furthermore, in the development and revision of the national implementation plan, the government has published the document for public comments at the drafting stage.

The government will continue to communicate with the relevant stakeholders.

3. Publicity activities

In addition to compilation and provision of information on POPs as explained in 3.11.1, the Ministries have taken actions such as press releases and distribution of pamphlets in occasions such as the agreement to the draft Convention text at the fifth Inter-Governmental Negotiating Committee, the adoption of the Convention at the Diplomatic Conference, Japan's accession to the Convention and the results of the meeting of the Conference of the Parties.

The government will continue to provide information on POPs on webpages and through pamphlets etc., and conduct press releases in a timely manner.

Section 12 Promotion of research and technological development

1. Overall policy

The Science and Technology Basic Plan (decided by the Government of Japan in January 2016) describing the basic policy for the promotion of science and technology for a period of 5 years from FY 2016, prescribes the "Target National Image" as "Ensure safety and security for our nation and its citizens and a high-quality, prosperous way of life" one of its targets. And to ensure a safe and secure living environment, the plan prescribes to promote development of evaluation and management technologies to protect sound water cycle, soil and ecosystem, and furthermore, utilize study results on rapid or sophisticated evaluation of chemicals as basic data for chemical safety assessment and promote them from the standpoint of international contribution.

2. Individual research and technological development

In accordance with paragraph 1 (a) to (g) of Article 11 of the Stockholm Convention, the following comprehensive research and technological development shall be promoted, regarding (1) the environmental behavior including source, monitoring, analysis and modeling, (2) effects on human health, the environment and society, (3) technologies for release reduction and detoxification.

In promoting these researches, it is important to note that the results should be applicable to and effective for not only Japan but also the neighboring countries or developing countries, because POPs issues are not limited to Japan.

(1) Environmental behavior including source, monitoring, analysis and modeling

Multimedia models for POPs on source, monitoring, analysis and modeling relevant to environmental behaviors was developed, taking into account environmental factors distinct to Japan and Asia.

A simple and rapid method for the extraction of POPs from soil was developed and studies to ascertain physiological mechanism regarding absorption and transportation of POPs in various crop plants were conducted. A study to develop a method to predict residual concentrations in cucurbitaceous vegetable based on POPs concentrations in agricultural soil was conducted.

Methods to enable sensitive detection of environmental POPs concentrations will be conducted as well.

For brominated dioxins, assessment was done on the status of emissions from sources.

(2) Effects on human health, the environment and society

Chemical substance specific prediction system, which estimates the chemical's degradability and accumulation, were developed by adopting evaluation methods using structure-activity relationship (SAR) based on chemical structure and empirical rules. Degradability and accumulation are items that are evaluated for POPs.

(3) Technologies for release reduction and detoxification

Basic studies were carried out including chemical degradation technologies using iron, soil decontamination technologies using complex degrading bacteria and wood based carbonization material, search of degrading bacteria, soil cleansing utilizing highly absorbent plants, and development of technologies to restrain absorption by crops through the application of absorption materials (activated carbon) to soil.

Chapter 4 Review and updating of the national implementation plan

The Inter-Ministerial General Directors' Meeting will review the national implementation plan, accommodating the periodic intervals on reporting the implementation status of the Convention decided by the Conference of the Parties at its first meeting, and publish the outcomes for comments.

Furthermore, the Inter-Ministerial General Directors' Meeting will, if necessary, update the national implementation plan and submit it to the Conference of Parties, in response to cases such as the addition of the chemicals to the Stockholm Convention, the revision of related domestic plans and various changes in the environment and the economy.

The national implementation plan will undergo public commenting for its revision, including the outcomes of the review.

Appendix

1. Status of general environment (Tables and Figures)

2. Government Plan to Reduce Dioxins Levels Resulting from Business Activities in Japan

1. Status of general environment (Tables and Figures)

Table 1: Status of monitoring of POPs (Wildlife/ Air)

		74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
Wildlife	Dioxins												O	O	O	O	B1	B1	B1	B1	B1	B1	B1	B1	B1	O	O	O,E	O	O	O	O	O	O										
	PCBs					B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1,E	B1	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2
	HCB	B1	B1			B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1		B1,E		B1,E	B1	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2
	Aldrin	B1				B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1		B1		B1					E				B2	B2	B2	B2	B2	B2	B2	B2					B2				
	Endrin	B1				B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1		B1		B1					E				B2	B2	B2	B2	B2	B2	B2	B2		B2			B2				
	Dieldrin	B1				B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1		B1,E		B1,E	B1	B2	B2	B2	B2	B2	B2	B2	B2		B2			B2				
	DDTs	B1				B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1,E	B1	B1,E	B1	B2	B2	B2	B2	B2	B2	B2	B2	B2			B2					B2
	Chlordanes								B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1,E	B1	B1,E	B1	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2		B2		
	Heptachlors								B1																					B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2		B2	B2		
	Toxaphenes																														B2	B2	B2	B2	B2	B2	B2					B2				B2
	Mirex																														B2	B2	B2	B2	B2	B2	B2		B2							B2
	HCHs	B1				B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1		B1		B1	B1	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	
	Hexabromobiphenyls																B1																			B2	B2	B2				B2				
	Polybromodiphenyl ethers (Br_4–Br_{10})														B1	B1														B2	B2					B2		B2	B2	B2	B2	B2	B2	B2	B2	B2
	Perfluorooctane sulfonic acid (PFOS)																														B2		B2			B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	
	Perfluorooctanoic acid (PFOA)																														B2		B2			B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	
	Pentachlorobenzene		B1				B1	B1	B1	B1	B1	B1	B1	B1		B1		B1		B1		B1		B1			B1							B2			B2	B2	B2	B2	B2	B2	B2	B2	B2	B2
	Chlordecone																																		B2		B2	B2								
	Endosulfan																																					B2	B2		B2	B2					
	1,2,5,6,9,10-Hexabromocyclododecane														B1																	B2					B2	B2		B2	B2	B2	B2	B2	B2	B2
	Total polychlorinated naphthalene			B1		B1	B1	B1	B1	B1	B1	B1	B1		B1		B1		B1		B1									B2				B2		B2						B2	B2	B2	B2	B2
	Hexachlorobuta-1,3-diene																																		B2					B2						
	Pentachlorophenol and its salts and esters																																										B2	B2	B2	
	Short chain chlorinated paraffins																															B2	B2										B2	B2	B2	
	Dicofol																																	B2		B2										B2
Air	Dioxins													O	O	O	O	O	O	O	O	O	O	O	A	A	A	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
	PCBs																								B1		B1	B1	B1	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2
	HCB																					B1				E	B1			B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2
	Aldrin																													B2	B2	B2	B2	B2	B2	B2	B2					B2				
	Endrin																													B2	B2	B2	B2	B2	B2	B2	B2		B2			B2				
	Dieldrin																													B2	B2	B2	B2	B2	B2	B2	B2		B2			B2				
	DDTs																													B2	B2	B2	B2	B2	B2	B2	B2	B2			B2		B2			B2
	Chlordanes													B1																B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2			B2		
	Heptachlors													B1																B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2		B2	B2		
	Toxaphenes																														B2	B2	B2	B2	B2	B2	B2					B2				B2
	Mirex																														B2	B2	B2	B2	B2	B2	B2		B2							B2
	HCHs																														(B2)	(B2)	(B2)	(B2)	(B2)	(B2)	B2	B2	B2	B2	B2	B2	B2	B2	B2	
	Hexabromobiphenyls																B1															B2					B2	B2				B2				
	Polybromodiphenyl ethers (Br_4–Br_{10})																												B1			B2				B2	B2	B2		B2	B2	B2	B2	B2
	Perfluorooctane sulfonic acid (PFOS)																															B2					B2	B2	B2	B2	B2	B2	B2	B2	
	Perfluorooctanoic acid (PFOA)																															B2					B2	B2	B2	B2	B2	B2	B2	B2	
	Pentachlorobenzene																					B1					B1								B2		B2	B2	B2	B2	B2	B2	B2	B2	B2
	Chlordecone																														B2							B2	B2						
	Endosulfan																			B1																		B2	B2		B2	B2	B2			
	1,2,5,6,9,10-Hexabromocyclododecane																																						B2	B2		B2	B2	B2	B2	
	Total polychlorinated naphthalene																									B1				B2						B2						B2		B2	B2	B2
	Hexachlorobuta-1,3-diene																																							B2		B2	B2	B2	B2	
	Pentachlorophenol and its salts and esters																																									B2	B2	B2	
	Short chain chlorinated paraffins																																									B2	B2	B2	
	Dicofol																																									B2			

B1: Survey on the actual condition of chemical substances in the environment (until FY2001); B2: Survey on the actual condition of chemical substances in the environment (after FY2002): D: Survey under the Law concerning Special Measures against Dioxins;
E: Survey on the environmental endocrine disruption; A: The air pollutants monitoring; O: Other survey
(B2): HCHs in air between FY2003 and FY2008 were treated as missing data.

* Detail of the survey on the actual condition of chemical substances in the environment: Refer to Ministry of the Environment web site: http://www.env.go.jp/chemi/kurohon/index.html (Also refer to annual reports before FY1996)
* Details of the survey under the Law concerning Special Measures against Dioxins: Refer to Ministry of the Environment web site http://www.env.go.jp/chemi/dioxin/report.html (Only in Japanese)
* Details of the survey on the environmental endocrine disruptors: Refer to the working group materials on Ministry of the Environment web site http://www.env.go.jp/chemi/end/index.html (Only in Japanese)

Table 2: Status of monitoring of POPs (Water/ Sediment/ Soil)

		74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
Water	Dioxins																									O	O	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
	PCBs		W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	B1, E, W	B1,W	B2, W	B2,W	B2,W	B2,W	B2,W	B2,W	B2,W	B2,W	B2,W	B2,W	B2,W	B2,W	B2,W	B2,W	B2,W	B2,W	B2,W	B2
	HCB	B1	B1			B1								B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1,E				B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2
	Aldrin	B1																								E				B2	B2	B2	B2	B2	B2	B2	B2									
	Endrin	B1																								E				B2	B2	B2	B2	B2	B2	B2	B2		B2			B2				
	Dieldrin	B1												B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1,E				B2	B2	B2	B2	B2	B2	B2	B2	B2	B2			B2				
	DDTs	B1												B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1,E				B2	B2	B2	B2	B2	B2	B2	B2	B2	B2			B2				
	Chlordanes								B1					B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1,E				B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2			B2		
	Heptachlors								B1																					B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2		B2			B2	
	Toxaphenes										B1																				B2	B2	B2	B2	B2	B2	B2								B2
	Mirex										B1																				B2	B2	B2	B2	B2	B2	B2		B2						B2
	HCHs	B1												B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1				B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	
	Hexabromobiphenyls																B1														B2					B2	B2	B2								
	Polybromodiphenyl ethers (Br_4–Br_{10})				B1										B1	B1								B1						B2	B2	B2	B2				B2	B2	B2	B2		B2	B2	B2	B2	B2
	Perfluorooctane sulfonic acid (PFOS)																													B2			B2				B2	B2	B2	B2		B2	B2	B2		B2
	Perfluorooctanoic acid (PFOA)																													B2			B2				B2	B2	B2	B2		B2	B2	B2		B2
	Pentachlorobenzene		B1				B1																												B2			B2	B2	B2	B2	B2	B2		B2	B2
	Chlordecone																																			B2		B2	B2							
	Endosulfan								B1																														B2	B2							B2
	1,2,5,6,9,10-Hexabromocyclododecane														B1																B2							B2			B2					
	Total polychlorinated naphthalene			B1		B1																						B1							B2										B2
	Hexachlorobuta-1,3-diene								B1																									B2						B2					
	Pentachlorophenol and its salts and esters	B1																						B1								B2									B2		B2	B2
	Short chain chlorinated paraffins																															B2	B2										B2	B2
	Dicofol					B1																													B2										
Sediment	Dioxins												O	O	O	O	B1	B1	B1	B1	B1	B1	B1	B1	B1	O	O	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
	PCBs																							B1	B1			B1,E	B1	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2
	HCB	B1	B1			B1								B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1,E	B1	B1	B1	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2
	Aldrin	B1																								E				B2	B2	B2	B2	B2	B2	B2	B2									B2
	Endrin	B1																								E				B2	B2	B2	B2	B2	B2	B2	B2		B2							B2
	Dieldrin	B1												B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1,E	B1	B1	B1	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2							B2
	DDTs	B1												B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1,E	B1	B1	B1	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2			B2				
	Chlordanes								B1					B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1,E	B1	B1	B1	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2			B2		
	Heptachlors								B1																					B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2		B2			B2	
	Toxaphenes										B1																				B2	B2	B2	B2	B2	B2	B2								B2
	Mirex										B1																				B2	B2	B2	B2	B2	B2	B2		B2						B2
	HCHs	B1												B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	
	Hexabromobiphenyls																B1														B2					B2	B2	B2								
	Polybromodiphenyl ethers (Br_4–Br_{10})				B1										B1	B1								B1						B2	B2	B2					B2	B2	B2	B2		B2	B2	B2	B2	B2
	Perfluorooctane sulfonic acid (PFOS)																														B2		B2				B2	B2	B2	B2		B2	B2	B2		B2
	Perfluorooctanoic acid (PFOA)																														B2		B2				B2	B2	B2	B2		B2	B2	B2		B2
	Pentachlorobenzene		B1				B1																												B2			B2	B2	B2	B2	B2	B2		B2	B2
	Chlordecone																																			B2		B2	B2							
	Endosulfan								B1																															B2	B2							B2
	1,2,5,6,9,10-Hexabromocyclododecane														B1																B2								B2	B2			B2	B2			
	Total polychlorinated naphthalene			B1		B1																						B1							B2										B2
	Hexachlorobuta-1,3-diene								B1																									B2						B2					
	Pentachlorophenol and its salts and esters	B1																						B1																	B2		B2	B2
	Short chain chlorinated paraffins																															B2	B2										B2	B2
	Dicofol					B1																										B2				B2								
Soil	Dioxins																									O	O	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	

B1: Survey on the actual condition of chemical substances in the environment (until FY2001); B2: Survey on the actual condition of chemical substances in the environment (after FY2002); D: Survey under the Law concerning Special Measures against Dioxins;
E: Survey on the environmental endocrine disruption; W: Survey under the Water Pollution Control Law; O: Other survey

* Detail of the survey on the actual condition of chemical substances in the environment: Refer to Ministry of the Environment web site: http://www.env.go.jp/chemi/kurohon/index.html (Also refer to annual reports before FY1996)
* Details of the survey under the Law concerning Special Measures against Dioxins: Refer to Ministry of the Environment web site http://www.env.go.jp/chemi/dioxin/report.html (Only in Japanese)
* Details of the survey on the environmental endocrine disruptors: Refer to the working group materials on Ministry of the Environment web site http://www.env.go.jp/chemi/end/index.html (Only in Japanese)

Table 3: Latest analytical method and minimum detectable concentrations for POPs

Compound	Wildlife	Air	Water	Sediment	Soil
Dioxins [1]	-	HRGC/HRMS	GC/MS	GC/HRMS	GC/HRMS
PCBs [2]	GC/HRMS-SIM-EI (21 pg/g-wet)	GC/HRMS-SIM-EI (0.8 pg/m^3)	GC/HRMS-SIM-EI or GC/TOF-MS EI or NICI (5 pg/L)	GC/HRMS-SIM-EI (55 pg/g-dry)	-
HCB	GC/HRMS-SIM-EI (1.1 pg/g-wet)	GC/HRMS-SIM-EI (0.2 pg/m^3)*	GC/HRMS-SIM-EI or GC/TOF-MS EI or NICI (0.6 pg/L)	GC/HRMS-SIM-EI (0.5pg/g-dry)	-
Drins	GC/HRMS (0.7 - 1 pg/g-wet)*	GC/HRMS (0.07 - 4 pg/m^3)*	GC/HRMS (0.2 pg/L)*	GC/HRMS (0.6 - 0.9 pg/g-dry)	-
DDTs	GC/HRMS (0.6 - 1 pg/g-wet)	GC/HRMS (0.01 - 0.03 pg/m^3)	GC/HRMS (0.08 - 0.4 pg/L)*	GC/HRMS (0.2 - 1.4 pg/g-dry)*	-
Chlordanes	GC/HRMS-SIM-EI (0.6 - 2 pg/g-wet)*	GC/HRMS-SIM-EI (0.05 - 0.3 pg/m^3)*	GC/HRMS-SIM-EI or GC/TOF-MS EI or NICI (0.6 - 2 pg/L)*	GC/HRMS-SIM-EI (0.7 - 2 pg/g-dry)*	-
Heptachlors	GC/HRMS-SIM-EI (0.7 - 3 pg/g-wet)*	GC/HRMS-SIM-EI (0.05 - 0.1 pg/m^3)*	GC/HRMS-SIM-EI or GC/TOF-MS EI or NICI (0.6 - 1 pg/L)*	GC/HRMS-SIM-EI (0.3 - 0.8 pg/g-dry)*	-
Toxaphenes	GC/Q-TOF MS-SIM-NCI (6 - 40 pg/g-wet)	GC/HRMS (0.2 pg/m^3)	GC/MS-NCI (2 - 20 pg/L)*	GC/MS-NCI (3 - 20 pg/g-dry)	-
Mirex	GC/HRMS (0.5 pg/g-wet)	GC/HRMS (0.01 pg/m^3)*	GC/HRMS (0.3 pg/L)	GC/HRMS (0.3 pg/g-dry)	-
HCHs	GC/HRMS-SIM-EI (0.9 - 1 pg/g-wet)*	GC/HRMS-SIM-EI (0.03 - 0.04 pg/m^3)*	GC/HRMS-SIM-EI or GC/TOF-MS EI or NICI (0.4 - 0.7 pg/L)*	GC/HRMS-SIM-EI (0.2 - 0.6 pg/g-dry)*	-
Hexabromobiphenyls [2]	GC/HRMS-SIM-EI (5 pg/g-wet)*	GC/HRMS (0.02 pg/m^3)*	GC/HRMS (0.9 pg/L)*	GC/HRMS-SIM-EI (0.3 pg/g-dry)*	-
Polybromodiphenyl ethers (Br_4-Br_{10})	GC/HRMS-SIM-EI (4 - 80 pg/g-wet)	GC/HRMS-SIM-EI (0.02 - 0.8 pg/m^3)	GC/HRMS-SIM-EI or GC/TOF-MS EI or NICI (1 - 5 pg/L)	GC/HRMS-SIM-EI (0.5 - 14 pg/g-dry)	-
Perfluorooctane sulfonic acid (PFOS)	LC/MS/MS-SRM-ESI-negative (4 pg/g-wet)*	LC/MS/MS-SRM-ESI-negative (0.1 pg/m^3)*	LC/MS/MS-SRM-ESI-negative(30 pg/L)	LC/MS/MS-SRM-ESI-negative(3 pg/g-dry)	-
Perfluorooctanoic acid (PFOA)	LC/MS/MS-SRM-ESI-negative (4 pg/g-wet)*	LC/MS/MS-SRM-ESI-negative (1.1 pg/m^3)*	LC/MS/MS-SRM-ESI-negative(30 pg/L)	LC/MS/MS-SRM-ESI-negative(4 pg/g-dry)*	-
Pentachlorobenzene	GC/HRMS-SIM-EI (5 pg/g-wet)	GC/HRMS-SIM-EI (0.08 pg/m^3)	GC/HRMS-SIM-EI or GC/TOF-MS EI or NICI (0.5 pg/L)	GC/HRMS-SIM-EI (0.3 pg/g-dry)	-
Chlordecone	LC/MS/MS-SRM-ESI-negative(0.2 pg/g-wet)*	GC/HRMS (0.02 pg/m^3)*	LC/MS/MS-SRM-ESI-negative(0.05 pg/L)*	LC/MS/MS-SRM-ESI-negative(0.20 pg/g-dry)*	-
Endosulfans	GC/HRMS-SIM-EI (11 - 38 pg/g-wet)*	GC/HRMS-SIM-EI (0.3 pg/m^3)*	GC/HRMS (10 - 40 pg/L)	GC/HRMS (2 pg/g-dry)	-
Hexabromocyclododecane	LC/MS/MS-SRM-ESI-negative(8 - 9 pg/g-wet)	LC/MS/MS-SRM-ESI-negative(0.1 pg/m^3)*	LC/MS/MS-SRM-ESI-negative(200 - 600 pg/L)*	LC/MS/MS-SRM-ESI-negative(50 - 60 pg/g-dry)*	-
Total polychlorinated naphthalene [2]	GC/HRMS-SIM-EI (12 pg/g-wet)*	GC/HRMS-SIM-EI (0.2 pg/m^3)	GC/HRMS-SIM-EI (30 pg/L)*	GC/HRMS-SIM-EI (3.2 pg/g-dry)	-

Compound	Wildlife	Air	Water	Sediment	Soil
Hexachlorobutadiene	GC/HRMS-SIM-EI (3.7 pg/g-wet)*	GC/MS-SIM-EI (10 pg/m^3)	GC/HRMS-SIM-EI (37 pg/L)*	GC/HRMS-SIM-EI (3.8 pg/g-dry)*	-
Pentachlorophenol and its salts and esters	GC/HRMS-SIM-EI (2 - 10 pg/g-wet)	GC/HRMS-SIM-EI (0.2 - 0.4 pg/m^3)	GC/HRMS-SIM-EI (6 - 9 pg/L)	GC/HRMS-SIM-EI (6 - 9 pg/g-dry)	-
Short-chain chlorinated paraffins	GC/TOF-MS EI or NICI (400 - 700 pg/g-wet)	LC/MS-SIR-APCI-negative(40 - 70 pg/m^3)	GC/HRMS-SIM-EI or GC/TOF-MS EI or NICI (400 - 1,500 pg/L)	GC/HRMS-SIM-EI (2,000 - 5,000 pg/g-dry)	-
Dicofol	GC/HRMS-SIM-EI (10 pg/g-wet)	GC/HRMS-SIM-EI (0.2 pg/m^3)*	GC/HRMS-SIM-EI (10 pg/L)*	GC/HRMS-SIM-EI (3.8 pg/g-dry)*	-

*: No survey in FY 2018 (analytical method and minimum detectable concentration for FY 2017 or before) -: No survey in FY 2018

1 The nationwide monitoring of dioxins was started in 1985 with respect to bottom sediment in the rivers, lakes and sea waters and aquatic organisms, and in 1986 with respect to the ambient air. In 1998, water and soil also became subject to nationwide monitoring of dioxins using HRGC/HRMS. A highly sensitive analytical method for PCBs, HRGC/HRMS was introduced in 2000. Moreover, the government has carried out nationwide environmental monitoring of other POPs, changing the analytical methods from GC-ECD to GC/HRMS (high-resolution) on wildlife, and from GC/MS to GC/HRMS (high-resolution) on water and bottom sediment. Besides above surveys, local governments have been monitoring PCBs in rivers, lakes, marshes and sea waters as part of the regular-observation system under the Water Pollution Prevention Act.

2 For PCBs and Hexabromobiphenyls, minimum detectable concentrations shown in the table are the sum of the limits for each congener.

Table 4: Number of survey sites for dioxins and their concentrations by fiscal year

Unit:
Air pg-TEQ/m^3
Water pg-TEQ/L
Sediment pg-TEQ/g
Soil pg/TEQ/g

Environmental mediums	Type of survey or site category (water groups)			FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	EQSs
Air	all sites		average	0.55	0.23	0.18	0.15	0.13	0.093	0.068	0.059	0.052	0.050	0.041	0.036	0.032	0.032	0.028	0.027	0.023	0.021	0.021	0.018	0.019	0.018	
			range	0.010 -1.4	0.0 -0.96	0.0065 -1.1	0.0073 -1.0	0.0090 -1.7	0.0066 -0.84	0.0066 -0.72	0.0083 -0.55	0.0039 -0.61	0.0053 -0.40	0.0042 -0.58	0.0032 -0.26	0.0049 -0.37	0.0054 -0.32	0.0051 -0.45	0.0047 -0.58	0.0029 -0.20	0.0036 -0.42	0.0042 -0.49	0.0034 -0.27	0.0033 -0.32	0.0032 -0.17	
			(no. of sites)	(68)	(458)	(463)	(920)	(979)	(966)	(913)	(892)	(825)	(763)	(740)	(721)	(712)	(691)	(689)	(676)	(666)	(645)	(660)	(642)	(629)	(619)	
		in general	average	0.55	0.23	0.18	0.14	0.14	0.093	0.064	0.058	0.051	0.051	0.041	0.035	0.031	0.031	0.028	0.025	0.022	0.020	0.019	0.017	0.018	0.018	0.6
			(no. of sites)	(63)	(381)	(353)	(705)	(762)	(731)	(691)	(694)	(628)	(577)	(565)	(538)	(536)	(530)	(522)	(520)	(508)	(497)	(497)	(493)	(481)	(471)	
		vicinity of sources	average	0.58	0.20	0.18	0.15	0.13	0.092	0.078	0.063	0.055	0.050	0.040	0.041	0.035	0.036	0.032	0.030	0.027	0.022	0.028	0.021	0.022	0.018	
			(no. of sites)	(2)	(61)	(96)	(189)	(190)	(206)	(188)	(161)	(165)	(158)	(148)	(156)	(147)	(133)	(142)	(132)	(135)	(122)	(137)	(125)	(124)	(122)	
		along roads	average	0.47	0.19	0.23	0.17	0.16	0.091	0.076	0.055	0.054	0.050	0.044	0.036	0.031	0.028	0.025	0.030	0.025	0.025	0.019	0.019	0.018	0.015	
			(no. of sites)	(3)	(16)	(14)	(26)	(27)	(29)	(34)	(37)	(32)	(28)	(27)	(27)	(29)	(28)	(25)	(24)	(23)	(26)	(26)	(24)	(24)	(26)	
Public Water	water	all sites	average	-	0.50	0.24	0.31	0.25	0.24	0.24	0.22	0.21	0.21	0.21	0.20	0.19	0.19	0.19	0.20	0.19	0.18	0.18	0.18	0.17	0.18	
			range		0.065 -13	0.054 -14	0.012 -48	0.0028 -27	0.010 -2.7	0.020 -11	0.0069 -4.6	0.0070 -5.6	0.014 -3.2	0.0097 -3.0	0.013 -3.0	0.011 -3.1	0.010 -2.1	0.012 -3.4	0.0084 -2.6	0.013 -3.2	0.012 -2.1	0.011 -4.9	0.011 -2.4	0.010 -1.7	0.0084 -4.1	
			(no. of sites)	-	(204)	(568)	(2,116)	(2,213)	(2,207)	(2,126)	(2,057)	(1,912)	(1,870)	(1,818)	(1,714)	(1,617)	(1,610)	(1,594)	(1,571)	(1,537)	(1,480)	(1,491)	(1,459)	(1,442)	(1,431)	
		River	average	-	-	0.40	0.36	0.28	0.29	0.27	0.25	0.24	0.23	0.25	0.23	0.21	0.22	0.22	0.23	0.22	0.20	0.21	0.21	0.20	0.20	
			(no. of sites)	-	-	(186)	(1,612)	(1,674)	(1,663)	(1,615)	(1,591)	(1,464)	(1,454)	(1,408)	(1,330)	(1,244)	(1,223)	(1,229)	(1,207)	(1,189)	(1,149)	(1,147)	(1,132)	(1,122)	(1,106)	1
		Lakes and Reservoirs	average	-	-	0.25	0.22	0.21	0.18	0.20	0.17	0.18	0.18	0.16	0.16	0.21	0.17	0.18	0.18	0.19	0.20	0.15	0.19	0.16	0.18	
			(no. of sites)	-	-	(63)	(104)	(95)	(102)	(99)	(100)	(89)	(91)	(91)	(90)	(86)	(91)	(79)	(87)	(83)	(75)	(93)	(82)	(78)	(90)	
		Sea area	average	-	-	0.14	0.13	0.13	0.092	0.094	0.095	0.082	0.096	0.072	0.078	0.077	0.073	0.065	0.069	0.070	0.070	0.069	0.068	0.074	0.077	
			(no. of sites)	-	-	(319)	(400)	(444)	(442)	(412)	(366)	(359)	(325)	(319)	(294)	(287)	(296)	(286)	(277)	(265)	(256)	(251)	(245)	(242)	(235)	
	Bottom Sediment	all sites	average	-	8.3	5.4	9.6	8.5	9.8	7.4	7.5	6.4	6.7	7.4	7.2	7.1	6.9	7.0	6.8	6.7	6.4	7.1	6.8	6.7	5.9	
			range		0.10 -260	0.066 -230	0.0011 -1,400	0.012 -540	0.0087 -640	0.057 -420	0.050 -1300	0.045 -510	0.056 -750	0.044 -290	0.067 -540	0.059 -390	0.054 -320	0.050 -640	0.042 -700	0.056 -640	0.068 -660	0.059 -1,100	0.053 -510	0.043 -610	0.0083 -430	
			(no. of sites)	-	(205)	(542)	(1,836)	(1,813)	(1,784)	(1,825)	(1,740)	(1,623)	(1,548)	(1,505)	(1,398)	(1,316)	(1,328)	(1,320)	(1,296)	(1,247)	(1,197)	(1,232)	(1,202)	(1,205)	(1,187)	
		River	average	-	-	5.0	9.2	7.3	8.5	6.3	7.1	5.6	5.8	6.6	6.5	6.3	5.9	6.3	6.0	6.1	5.7	6.6	6.4	6.1	5.1	
			(no. of sites)	-	-	(171)	(1,367)	(1,360)	(1,338)	(1,377)	(1,336)	(1,241)	(1,191)	(1,152)	(1,071)	(1,011)	(1,001)	(1,009)	(982)	(948)	(921)	(942)	(917)	(928)	(903)	150
		Lakes and Reservoirs	average	-	-	9.8	11	18	13	11	9.4	8.4	9.2	10	9.2	10	9.1	9.0	8.8	8.5	8.9	8.2	7.7	8.1	7.9	
			(no. of sites)	-	-	(52)	(102)	(85)	(86)	(89)	(90)	(79)	(84)	(82)	(82)	(75)	(84)	(68)	(76)	(73)	(64)	(86)	(76)	(70)	(83)	
		Sea area	average	-	-	4.9	11	11	14	11	9.0	9.2	9.7	10	9.4	10	9.5	9.5	8.6	8.7	9.1	8.4	8.7	8.8		
			(no. of sites)	-	-	(319)	(367)	(368)	(360)	(359)	(314)	(303)	(273)	(271)	(245)	(230)	(243)	(243)	(238)	(226)	(212)	(204)	(209)	(207)	(201)	
Ground Water			average	-	0.17	0.096	0.092	0.074	0.066	0.059	0.063	0.047	0.056	0.055	0.048	0.055	0.048	0.047	0.049	0.26	0.050	0.042	0.055	0.049	0.044	
			range	-	0.046 -5.5	0.062 -0.55	0.00081 -0.89	0.00020 -0.92	0.011 -2.0	0.00032- 0.67	0.0079 -3.2	0.0088 -0.72	0.013 -2.2	0.0076 -2.4	0.010 -0.38	0.011 -0.88	0.0098 -0.44	0.0084 -0.62	0.0084 -1.6	0.011 -110	0.012 -1.0	0.0036 -0.88	0.0073 -3.7	0.0071 -0.66	0.0072 -0.36	1
			(no. of sites)	-	(188)	(296)	(1,479)	(1,473)	(1,310)	(1,200)	(1,101)	(922)	(878)	(759)	(634)	(608)	(590)	(538)	(546)	(556)	(530)	(515)	(513)	(498)	(511)	
Soil	Total		average	-	6.5	-	6.9	6.2	3.8	4.4	3.1	5.9	2.6	3.1	3.1	2.5	3.0	3.4	2.6	3.6	2.3	2.6	3.2	3.4	2.5	
			range	-	0.0015 -61	-	0 -1,200	0 -4,600	0 -250	0 -1,400	0 -250	0 -2,800	0 -330	0 -170	0 -190	0 -85	0 -94	0 -140	0 -150	0 -230	0 -100	0 -100	0 -210	0 -150	0 -150	
			(no. of sites)	-	(286)	-	(3,031)	(3,735)	(3,300)	(3,059)	(2,618)	(1,782)	(1,505)	(1,285)	(1,073)	(976)	(998)	(969)	(917)	(921)	(872)	(852)	(833)	(835)	(818)	
		in general	average	-		-	4.6	3.2	3.4	2.6	2.2	2.0	1.9	2.7	2.8	2.1	2.1	2.0	1.6	2.2	1.6	1.8	2.0	1.7	1.4	1,000
			(no. of sites)	-		-	(1,942)	(2,313)	(2,282)	(2,128)	(1,983)	(1,314)	(1,159)	(991)	(831)	(717)	(714)	(674)	(654)	(647)	(603)	(599)	(577)	(583)	(559)	
		vicinity of sources	average	-		-	11	11	4.7	8.4	6.0	17	5.0	4.3	4.1	3.5	5.4	6.7	5.0	7.0	4.0	4.4	5.9	7.2	4.7	
			(no. of sites)	-		-	(1,089)	(1,422)	(1,018)	(931)	(635)	(468)	(346)	(294)	(242)	(259)	(284)	(295)	(263)	(274)	(269)	(253)	(256)	(252)	(259)	

(Air)

Note 1: From FY1997 to FY 1999, the data is the results of environmental air monitor survey under the Air Pollution Control Law (The survey results of old Environment Agency are included).

Note 2: It limits to the sites evaluating the annual average with environmental quality standards.

Note 3: For the calculation of toxicity equivalent, I-TEF(1988), WHO-TEF (1998) and WHO-TEF (2006) have been used before FY 1998, from FY 1999 to FY 2007, and after FY 2008, respectively.

Note 4:In principle, before FY 1998, when the concentration measurement of each isomer is less than minimum limit of determination, the toxicity equivalent has been calculated as zero.

After FY 1999, when the concentration measurement of each isomer is less than minimum limit of determination and it is more than the detection lower bound, toxicity equivalent is calculated as it is. When it is less than the detection lower bound, the toxicity equivalent has been calculated by using the value of 1/2 of the detection lower bound for each isomer.

(Water quality of public waters and groundwater)
Note 1: WHO-TEF(1998) has been used for the calculation of toxicity equivalent before FY 2007, and WHO-TEF (2006) has been used after FY 2008.
Note 2: When the concentration measurement of each isomer is less than minimum limit of determination and it is more than the detection lower bound, toxicity equivalent is calculated as it is. When it is less than the detection lower bound, the toxicity equivalent has been calculated by using the value of 1/2 of the detection lower bound for each isomer.

(Soil)
Note 1: WHO-TEF(1998) has been used for the calculation of toxicity equivalent before FY 2007, and WHO-TEF (2006) has been used after FY 2008.
Note 2: When the concentration measurement of each isomer is less than minimum limit of determination, the toxicity equivalent has been calculated as zero.
Note 3: After FY 2009, results of sites using simplified assay are not included in the table above, by reason that the results cannot be used for calculation of average, concentration range, etc.
Note4: The survey has been conducting according to the annual plan by the local governments. Number of survey sites for each year is not same.

Table 5: Concentration distributions of PCBs in water (FY 2018)

Local communities	Monitored sites	Concentrations (pg/L)
Hokkaido	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari (Ishikari City)	180
Iwate Pref.	Riv. Toyosawa (Hanamaki City)	19
Miyagi Pref.	Sendai Bay (Matsushima Bay)	63
Akita Pref.	Lake Hachiro	60
Yamagata Pref.	Mouth of Riv. Mogami (Sakata City)	25
Fukushima Pref.	Onahama Port	190
Ibaraki Pref.	Tonekamome-ohasi Bridge, Mouth of Riv. Tone (Kamisu City)	100
Tochigi Pref.	Tagawa Kyubun Area Head Works (Utsunomiya City)	120
Saitama Pref.	Akigaseshusuizeki of Riv. Arakawa (Shiki City)	97
Chiba City	Mouth of Riv. Hanami (Chiba City)	150
Tokyo Met.	Mouth of Riv. Arakawa (Koto Ward)	480
	Mouth of Riv. Sumida (Minato Ward)	2,600
Yokohama City	Yokohama Port	530
Kawasaki City	Keihin Canal, Port of Kawasaki	860
Niigata Pref.	Lower Riv. Shinano (Niigata City)	340
Toyama Pref.	Hagiura-bashi Bridge, Mouth of Riv. Jintsu (Toyama City)	550
Ishikawa Pref.	Mouth of Riv. Sai (Kanazawa City)	1,000
Fukui Pref.	Mishima-bashi Bridge, Riv. Shono (Tsuruga City)	2,500
Nagano Pref.	Lake Suwa (center)	91
Shizuoka Pref.	Riv. Tenryu (Iwata City)	43
Aichi Pref.	Nagoya Port	650
Mie Pref.	Yokkaichi Port	220
Shiga Pref.	Lake Biwa (center, offshore of Karasaki)	70
Kyoto Pref.	Miyazu Port	29
Kyoto City	Miyamae-bashi Bridge,Riv. Katsura (Kyoto City)	770
Osaka Pref.	Mouth of Riv. Yamato (Sakai City)	640
Osaka City	Osaka Port	2,000
Hyogo Pref.	Offshore of Himeji	140
Kobe City	Kobe Port (center)	1,600
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa (Wakayama City)	290
Okayama Pref.	Offshore of Mizushima	120
Hiroshima Pref.	Kure Port	240
	Hiroshima Bay	95
Yamaguchi Pref.	Tokuyama Bay	51
	Offshore of Ube	39
	Offshore of Hagi	28
Tokushima Pref.	Mouth of Riv. Yoshino (Tokushima City)	35
Kagawa Pref.	Takamatsu Port	380
Kochi Pref.	Mouth of Riv. Shimanto (Shimanto City)	tr(11)
Kitakyushu City	Dokai Bay	1,200
Saga Pref.	Imari Bay	38
Nagasaki Pref.	Omura Bay	16
Kumamoto Pref.	Hiraki-bashi Bridge, Riv. Midori (Uto City)	170
Miyazaki Pref.	Mouth of Riv. Oyodo (Miyazaki City)	29
Kagoshima Pref.	Shinkawa-bashi Bridge, Riv. Amori (Kirishima City)	14
	Gotanda-bashi Bridge, Riv. Gotanda (Ichikikushikino City)	23
Okinawa Pref.	Naha Port	830

Table 6: Concentration distributions of PCBs in sediment (FY 2018)

Local communities	Monitored sites	Concentrations (pg/g-dry)
Hokkaido	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari (Ishikari City)	1,700
	Tomakomai Port	13,000
Iwate Pref.	Riv. Toyosawa (Hanamaki City)	tr(74)
Miyagi Pref.	Sendai Bay (Matsushima Bay)	3,800
Sendai City	Hirose-ohashi Bridge, Riv. Hirose (Sendai City)	230
Akita Pref.	Lake Hachiro	2,600
Yamagata Pref.	Mouth of Riv. Mogami (Sakata City)	650
Fukushima Pref.	Onahama Port	36,000
Ibaraki Pref.	Tonekamome-ohasi Bridge, Mouth of Riv. Tone (Kamisu City)	310
Tochigi Pref.	Tagawa Kyubun Area Head Works (Utsunomiya City)	350
Chiba Pref.	Coast of Ichihara and Anegasaki	30,000
Chiba City	Mouth of Riv. Hanami (Chiba City)	730
Tokyo Met.	Mouth of Riv. Arakawa (Koto Ward)	55,000
	Mouth of Riv. Sumida (Minato Ward)	310,000
Yokohama City	Yokohama Port	120,000
Kawasaki City	Mouth of Riv. Tama (Kawasaki City)	48,000
	Keihin Canal, Port of Kawasaki	170,000
Niigata Pref.	Lower Riv. Shinano (Niigata City)	810
Toyama Pref.	Hagiura-bashi Bridge, Mouth of Riv. Jintsu (Toyama City)	1,100
Ishikawa Pref.	Mouth of Riv. Sai (Kanazawa City)	4,800
Fukui Pref.	Mishima-bashi Bridge, Riv. Shono (Tsuruga City)	970
Yamanashi Pref.	Senshu-bashi Bridge, Riv. Arakawa (Kofu City)	tr(160)
Nagano Pref.	Lake Suwa (center)	7,600
Shizuoka Pref.	Shimizu Port	18,000
	Riv. Tenryu (Iwata City)	190
Aichi Pref.	Kinuura Port	13,000
	Nagoya Port	33,000
Mie Pref.	Yokkaichi Port	55,000
	Toba Port	100,000
Shiga Pref.	Lake Biwa (center, offshore of Minamihira)	6,200
	Lake Biwa (center, offshore of Karasaki)	18,000
Kyoto Pref.	Miyazu Port	1,600
Kyoto City	Miyamae-bashi Bridge,Riv. Katsura (Kyoto City)	6,400
Osaka Pref.	Mouth of Riv. Yamato (Sakai City)	24,000
Osaka City	Osaka Port	720,000
	Outside Osaka Port	17,000
	Mouth of Riv. Yodo (Osaka City)	59,000
	Kema-bashi Bridge, Riv. Oh-kawa (Osaka City)	260,000
Hyogo Pref.	Offshore of Himeji	94,000
Kobe City	Kobe Port (center)	270,000
Nara Pref.	Riv. Yamato (Oji Town)	1,000
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa (Wakayama City)	6,500
Okayama Pref.	Offshore of Mizushima	2,700
Hiroshima Pref.	Kure Port	92,000
	Hiroshima Bay	24,000
Yamaguchi Pref.	Tokuyama Bay	4,600
	Offshore of Ube	9,900
	Offshore of Hagi	860
Tokushima Pref.	Mouth of Riv. Yoshino (Tokushima City)	250
Kagawa Pref.	Takamatsu Port	32,000
Ehime Pref.	Niihama Port	2,700
Kochi Pref.	Mouth of Riv. Shimanto (Shimanto City)	790
Kitakyushu City	Dokai Bay	380,000
Fukuoka City	Hakata Bay	8,300
Saga Pref.	Imari Bay	6,200
Nagasaki Pref.	Omura Bay	7,600
Oita Pref.	Mouth of Riv. Oita (Oita City)	620
Miyazaki Pref.	Mouth of Riv. Oyodo (Miyazaki City)	nd
Kagoshima Pref.	Riv. Amori (Kirishima City)	nd
	Riv. Gotanda (Ichikikushikino City)	nd
Okinawa Pref.	Naha Port	91,000

Table 7: Measurement situation of PCBs in public water and groundwater (FY 2018)

	Public water								
	River		Lakes and Reservoirs		Sea waters		All sites		
	a: no. of location exceeding EQSs	b: no. of location surveyed	a: no. of location exceeding EQSs	b: no. of location surveyed	a: no. of location exceeding EQSs	b: no. of location surveyed	a: no. of location exceeding EQSs	b: no. of location surveyed	a/b (%)
PCB	0	1,743	0	128	0	410	0	2,281	0

EQSs: Environmental quality standards

Table 8: Concentration distributions of Chlordanes in fish (FY 2016)

Local communities	Monitored sites	Wildlife species	Concentrations (pg/g-wet)
Hokkaido	Offshore of Kushiro	Chum salmon	430
	Offshore of Kushiro	Rock greenling	440
	Offshore of Japan Sea (offshore of Iwanai)	Greenling	360
Iwate Pref.	Yamada Bay	Greenling	720
Miyagi Pref.	Sendai Bay	Greenling	510
Ibaraki Pref.	Offshore of Joban	Pacific saury	1,100
Tokyo Met.	Tokyo Bay	Sea bass	4,300
Kawasaki City	Offshore of Ogishima Island, Port of Kawasaki	Sea bass	2,800
Nagoya City	Nagoya Port	Striped mullet	2,500
Shiga Pref.	Lake Biwa, Riv. Azumi	Dace	8,100
Osaka Pref.	Osaka Bay	Sea bass	6,300
Hyogo Pref.	Offshore of Himeji	Sea bass	8,100
Tottori Pref.	Nakaumi	Sea bass	690
Hiroshima City	Hiroshima Bay	Sea bass	2,500
Kagawa Pref.	Takamatsu Port	Striped mullet	3,500
Kochi Pref.	Mouth of Riv. Shimanto	Sea bass	790
Oita Pref.	Mouth of Riv. Oita	Sea bass	790
Kagoshima Pref.	West Coast of Satsuma Peninsula	Sea bass	780
Okinawa Pref.	Nakagusuku Bay	Okinawa seabream	6,700

Table 9: Concentration distributions of Chlordanes in sediment (FY 2017)

Local communities	Monitored sites	Concentrations (pg/g-dry)
Hokkaido	Onnenai-ohashi Bridge, Riv. Teshio(Bifuka Town)	tr(15)
	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City)	280
	Tomakomai Port	39
Iwate Pref.	Riv. Toyosawa(Hanamaki City)	tr(13)
Miyagi Pref.	Sendai Bay(Matsushima Bay)	65
Sendai City	Hirose-ohashi Bridge, Riv. Hirose(Sendai City)	200
Akita Pref.	Lake Hachiro	110
Yamagata Pref.	Mouth of Riv. Mogami(Sakata City)	53
Fukushima Pref.	Onahama Port	540
Ibaraki Pref.	Tonekamome-ohasi Bridge, Mouth of Riv. Tone(Kamisu City)	65
Tochigi Pref.	Tagawa Kyubun Area Head Works(Utsunomiya City)	64
Chiba Pref.	Coast of Ichihara and Anegasaki	250
Chiba City	Mouth of Riv. Hanami(Chiba City)	450
Tokyo Met.	Mouth of Riv. Arakawa(Koto Ward)	3,300
	Mouth of Riv. Sumida(Minato Ward)	8,400
Yokohama City	Yokohama Port	590
Kawasaki City	Mouth of Riv. Tama(Kawasaki City)	2,700
	Keihin Canal, Port of Kawasaki	690
Niigata Pref.	Lower Riv. Shinano(Niigata City)	100
Toyama Pref.	Hagiura-bashi Bridge, Mouth of Riv. Jintsu(Toyama City)	120
Ishikawa Pref.	Mouth of Riv. Sai(Kanazawa City)	570
Fukui Pref.	Mishima-bashi Bridge, Riv. Shono(Tsuruga City)	nd
Yamanashi Pref.	Senshu-bashi Bridge, Riv. Arakawa(Kofu City)	100
agano Pref.	Lake Suwa(center)	640
Shizuoka Pref.	Shimizu Port	240
	Riv. Tenryu(Iwata City)	23
Aichi Pref.	Kinuura Port	120
	Nagoya Port	200
Mie Pref.	Yokkaichi Port	210
	Toba Port	110
Shiga Pref.	Lake Biwa(center, offshore of Minamihira)	1,200
	Lake Biwa(center, offshore of Karasaki)	240
Kyoto Pref.	Miyazu Port	tr(14)
Kyoto City	Miyamae-bashi Bridge,Riv. Katsura(Kyoto City)	79
Osaka Pref.	Mouth of Riv. Yamato(Sakai City)	6,300
Osaka City	Kema-bashi Bridge, Riv. Oh-kawa (Osaka City)	4,300
	Mouth of Riv. Yodo(Osaka City)	1,800
	Osaka Port	2,400
	Outside Osaka Port	290
Hyogo Pref.	Offshore of Himeji	280
Kobe City	Kobe Port(center)	310
Nara Pref.	Taisho-bashi Bridge, Riv. Yamato(Oji Town)	490
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa(Wakayama City)	95
Okayama Pref.	Offshore of Mizushima	22
Hiroshima Pref.	Kure Port	280
	Hiroshima Bay	290
Yamaguchi Pref.	Tokuyama Bay	58
	Offshore of Ube	78
	Offshore of Hagi	tr(8.3)
Tokushima Pref.	Mouth of Riv. Yoshino(Tokushima City)	40
Kagawa Pref.	Takamatsu Port	9,400
Ehime Pref.	Niihama Port	nd
Kochi Pref.	Mouth of Riv. Shimanto(Shimanto City)	87
Kitakyushu City	Dokai Bay	450
Fukuoka City	Hakata Bay	160
Saga Pref.	Imari Bay	84
Nagasaki Pref.	Omura Bay	97
Oita Pref.	Mouth of Riv. Oita(Oita City)	28
Miyazaki Pref.	Mouth of Riv. Oyodo(Miyazaki City)	70
Kagoshima Pref.	Riv. Amori(Kirishima City)	34
	Gotanda-bashi Bridge, Riv. Gotanda(Ichikikushikino City)	140
Okinawa Pref.	Naha Port	9,400

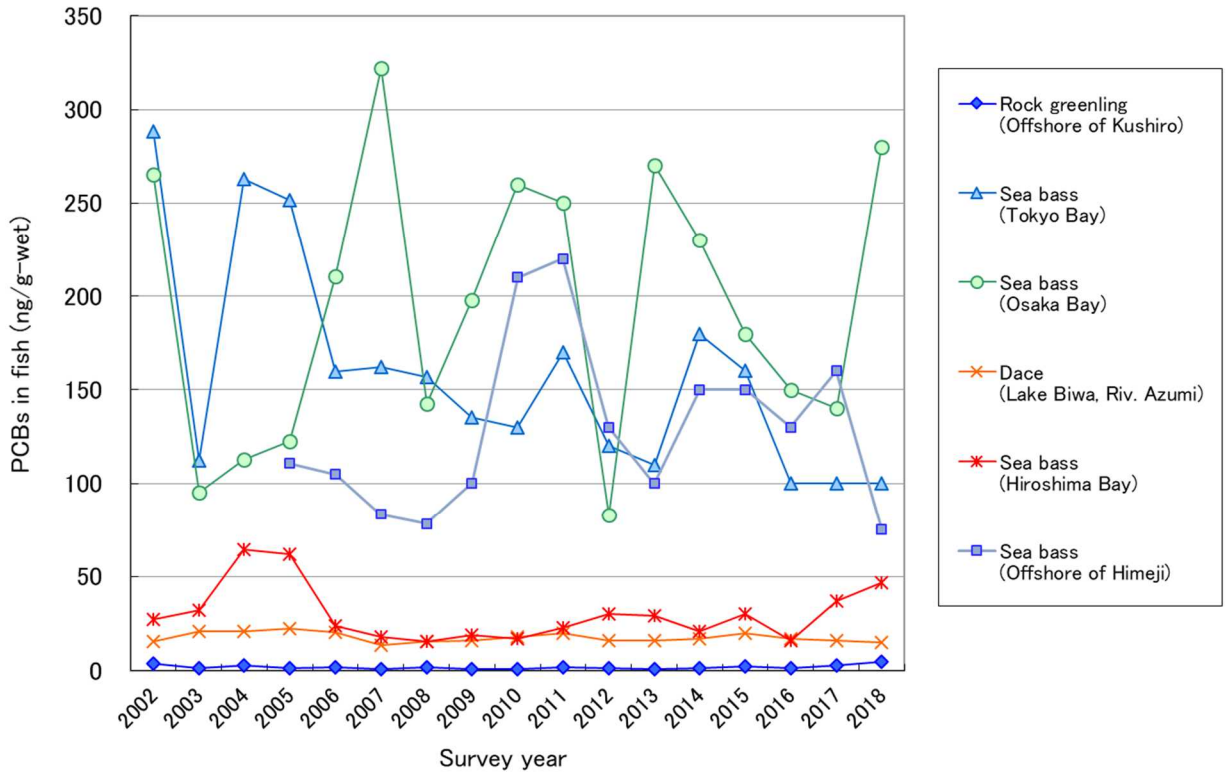


Figure 1: Temporal trends of PCBs concentrations in fish

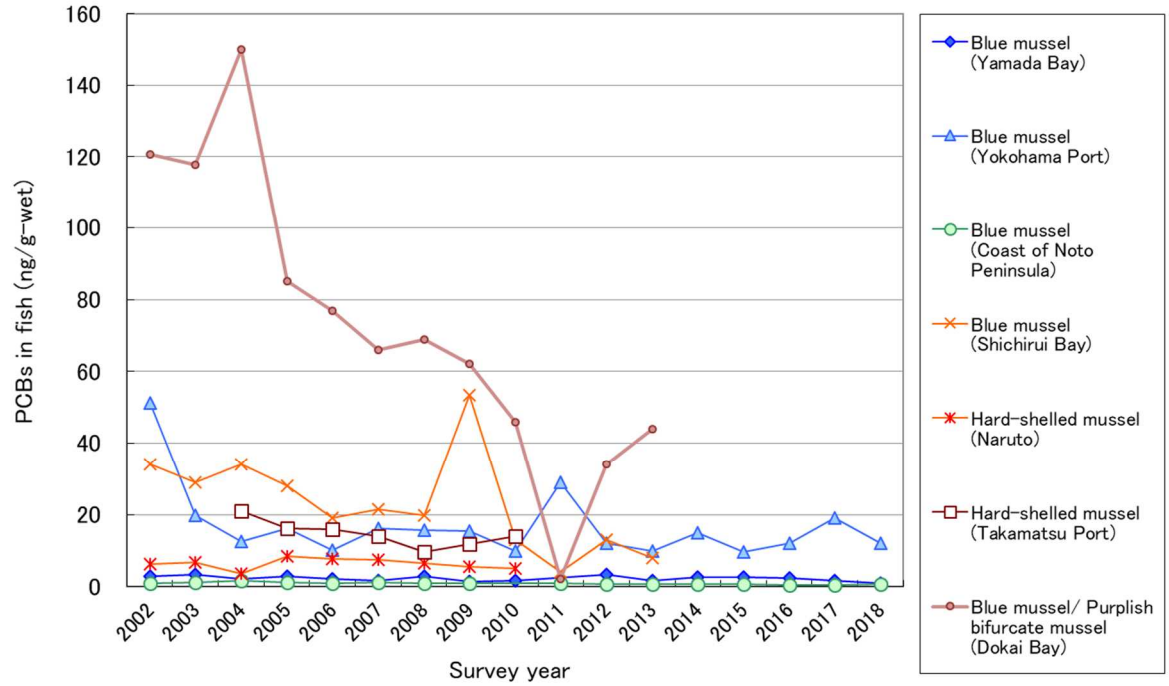
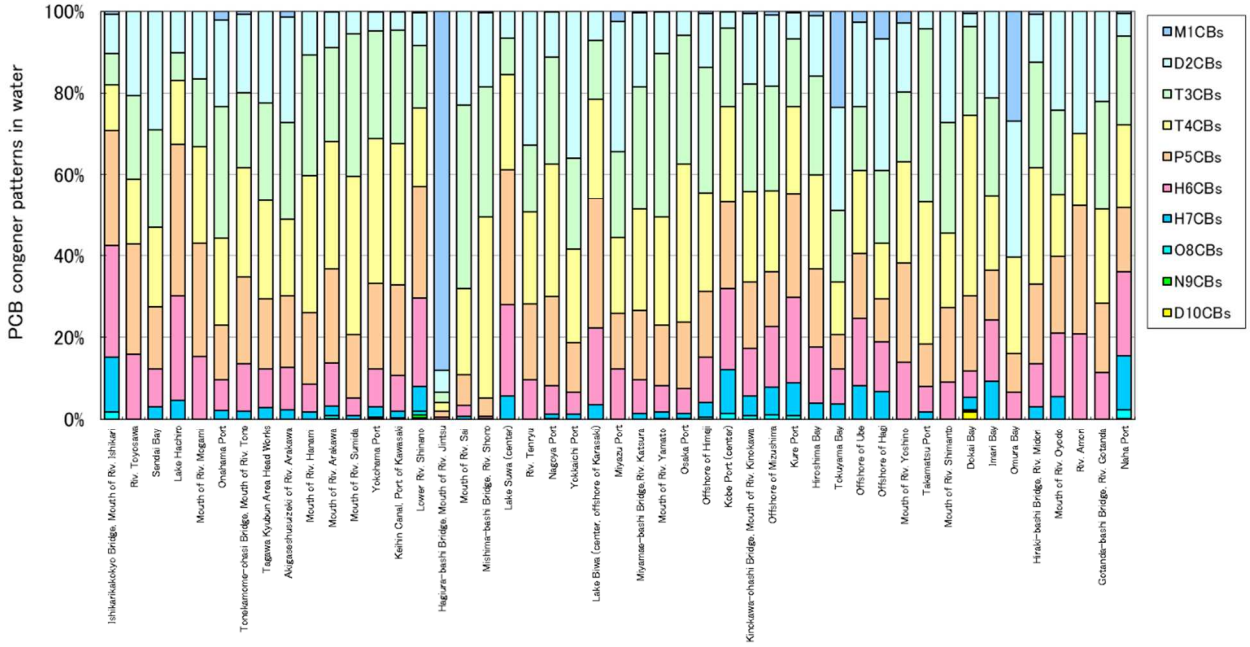


Figure 2: Temporal trends of PCBs concentrations in bivalves



(* Only data which total concentration is above minimum limit of determination (nd) is included.)

Figure 3: Ratio by site of analogues in PCBs concentrations in water (FY 2018)

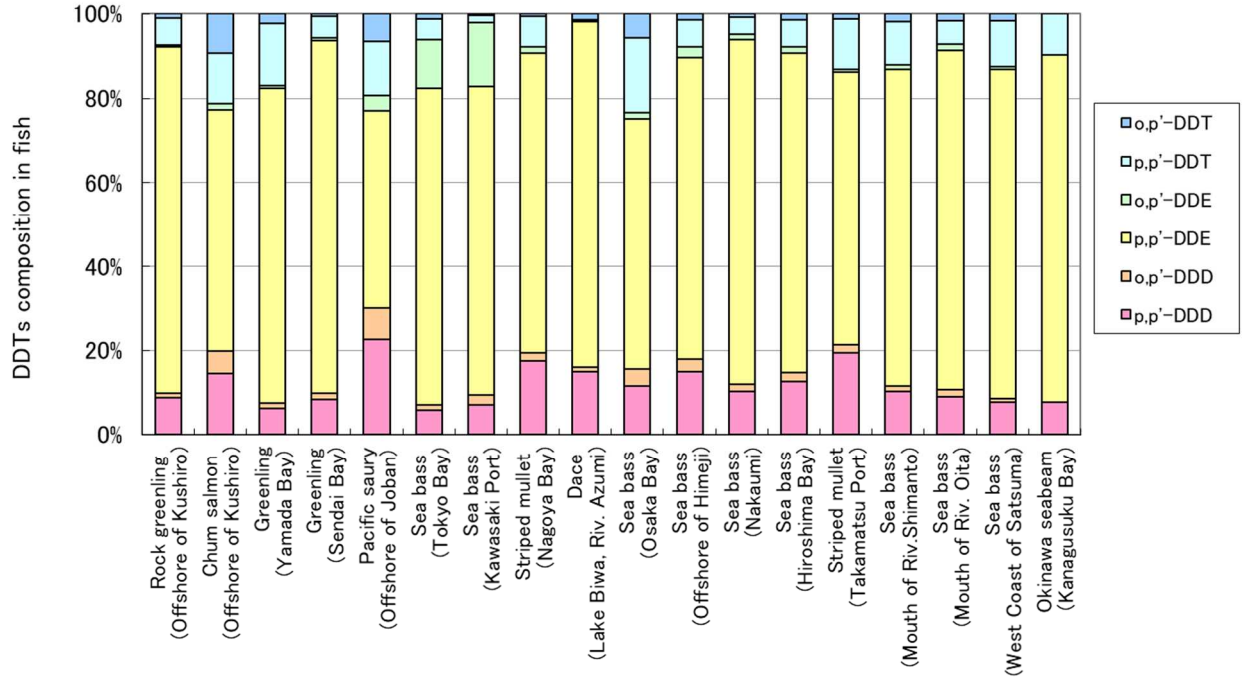


Figure 4: DDTs composition in fish (FY 2018)

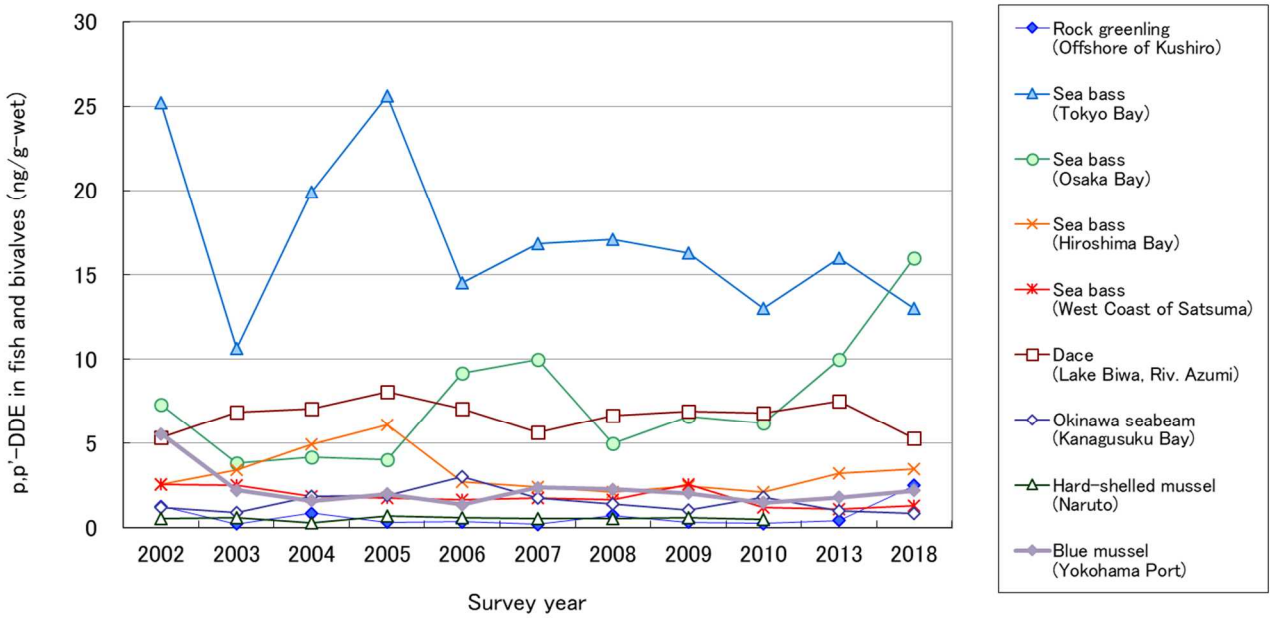


Figure 5: Temporal trends of p,p'-DDE concentrations in fish and bivalves

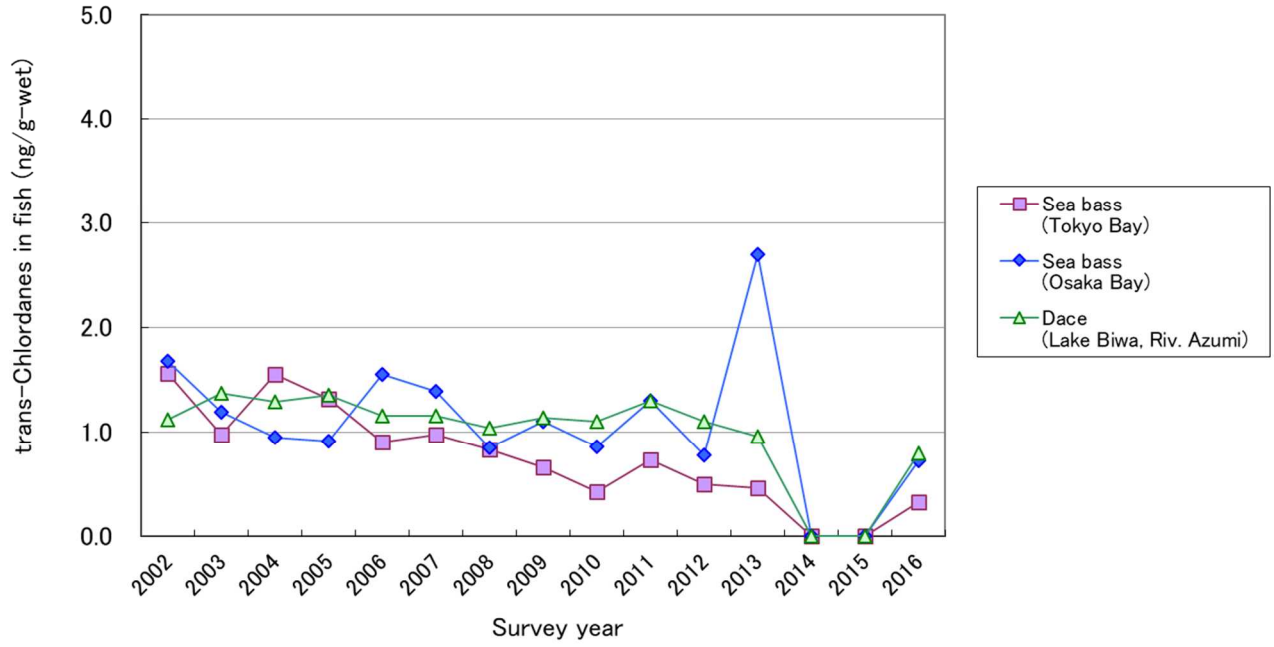


Figure 6: Temporal trends of Chlordanes concentrations in sediment

2. Government Plan to Reduce Dioxins Levels Resulting from Business Activities in Japan
(Modified in August 2012)

Government Plan to Reduce Dioxins Levels Resulting from Business Activities in Japan

Pursuant to Paragraph 4 of Article 33 of the Law Concerning Special Measures against Dioxins (Law No.105 of 1999) as correspondingly applied Paragraph 5, the government publishes the Government Plan to Reduce Dioxins Levels Resulting from Business Activities in Japan, modified as follows according to Paragraph 1 of Article 33:

Section 1 Reduction targets relating to the estimated amount of dioxins emissions categorized by field of business activities in Japan

In view of environmental improvements in recent years, reduction targets of the estimated amounts of dioxins emissions, categorized by fields of business activities in Japan, shall be as follows for the time being, on the assumption that continuous efforts will be made to reduce emissions to the extent possible, with the principle that the improved environment will not be exacerbated.

Also, the degree of the accomplishment of the reduction targets shall be evaluated every 5 years, together with the review of the action plan under Article 5 of the Stockholm Convention on Persistent Organic Pollutants (hereafter referred to as “Stockholm Convention”).

<table>
<tr><th rowspan="2">Field of business activities</th><th rowspan="2">Reduction targets (g-TEQ/year)</th><th colspan="2">(Reference) Reduction targets in the previous plans (g-TEQ/year)</th><th colspan="3">(Reference) Estimated amounts of dioxins emissions (g-TEQ/year)</th></tr>
<tr><th>Reduction targets (as of 2003)</th><th>Reduction targets (as of 2010)</th><th>1997</th><th>2003</th><th>2010</th></tr>
<tr><td>1 Fields of waste disposal</td><td>106</td><td>576-622</td><td>164-189</td><td>7,205-7,658</td><td>219-244</td><td>94-95</td></tr>
<tr><td>(1) Municipal waste incinerators</td><td>33</td><td>310</td><td>51</td><td>5000</td><td>71</td><td>33</td></tr>
<tr><td>(2) Industrial waste incinerators</td><td>35</td><td>200</td><td>50</td><td>1505</td><td>75</td><td>29</td></tr>
<tr><td>(3) Small-scale waste incinerators (subject to laws)</td><td>22</td><td rowspan="2">66-122</td><td rowspan="2">63-88</td><td rowspan="2">700-1,153</td><td rowspan="2">73-98</td><td>19</td></tr>
<tr><td>(4) Small-scale waste incinerators (exempt from laws)</td><td>16</td><td>13-14</td></tr>
<tr><td>2 Fields of industry</td><td>70</td><td>264</td><td>146</td><td>470</td><td>149</td><td>61</td></tr>
<tr><td>(1) Electric steel-making furnaces</td><td>31.1</td><td>130.3</td><td>80.3</td><td>229</td><td>80.3</td><td>30.1</td></tr>
<tr><td>(2) Sintering facilities for steel industry</td><td>15.2</td><td>93.2</td><td>35.7</td><td>135</td><td>35.7</td><td>10.9</td></tr>
</table>

	(3) Facilities for recovering zinc (Roasting furnaces, Sintering furnaces, Blast furnaces, Melting furnaces and Drying furnaces)	3.2	13.8	5.5	47.4	5.5	2.3
	(4) Facilities for manufacturing aluminum base alloy (Roasting furnaces, Melting furnaces and dry kilns)	10.9	11.8	14.3	31.0	17.4	8.7
	(5) Other facilities	9.8	15	10.4	27.3	10.3	8.8
3 Others		0.2	3-5	4.4-7.7	1.2	0.6	0.2
Total		176	843-891	315-343	7,676-8,129	368-393	155-156

Note 1: Reduction targets represent annual amounts of dioxins emissions after measures to reduce dioxins in emission gas and effluent water have been taken.

Note 2: Ranges in the columns result from different estimation methods.

Note 3: The same reduction target was established for the small-scale waste incinerators subject to laws and those exempt from laws in the previous plans. For this plan, the different targets are established.

Note 4: In the fields of industry, the two different reduction targets were established in the previous plans for the facilities for recovering copper and the pulping process with bleaching. For this plan, they are integrated into "(5) Other facilities", as only tiny amounts of emissions were detected.

Note 5: "3 Others" is sewage disposal facilities and waste disposal sites. While crematoria, cigarette smoke, and exhaust emissions from motor vehicles were included in "3 Others" in the previous plans, they are not covered in this plan (For this reason, their previous estimated amounts of emissions are not counted in).

Remark: Unit "g-TEQ/year" is used to represent annual emissions of dioxins in terms of the toxic equivalent quantity (TEQ), which sums up toxicities of dioxin congeners, in relation to the toxic equivalency factor (the factor representing the toxicity of a dioxin congener relative to the toxicity of 2,3,7,8-TeCDD, which is the most toxic among dioxins). "WHO-TEF (1998)" means the TEF published by WHO in 1998.
WHO- TEF (1998) is used as the toxic equivalence factor for the calculation of emissions from 1997 to 2003 and the reduction targets in the previous plans. For emissions in 2010 and the reduction targets in this plan, WHO- TEF (2006) is used to the extent possible.

Section 2 Measures for businesses in order to achieve reduction targets

1. Compliance with emission standards, etc.

(1) Compliance with the emission standard for the emission gas and effluent standard for the effluent water etc.

Pursuant to Article 20 of the Law Concerning Special Measures against Dioxins (Law No.105 of 1999, hereinafter referred to as "the Dioxins Law"), businesses shall not release emission or effluent whose level of dioxins contained complies with emission standards, at the outlets of emission of a facility subject to emission standard and at the drainage outlets of a facility which is installed in a site subject to effluent standard.

Also, in cases that the total mass emission control standard is established pursuant to Article 10 of the

Dioxins Law, businesses must comply with the standard.

(2) Prevention of environmental pollution by dioxins

Pursuant to Article 4 of the Dioxins Law, businesses shall take the necessary measures for the prevention of environmental pollution by dioxins resulting from their business activities including the prevention of accidents that may cause dioxins emissions. Businesses shall also cooperate any measures implemented by the national government or local public authorities with regard to the prevention, etc. of environmental pollution by dioxins.

The above-mentioned measures by the national government include the development and implementation of the Action Plan under Article 5 of the Stockholm Convention on Persistent Organic Pollutants (hereinafter referred as to "Stockholm Convention") and the promotion of the use of best available techniques (BAT) and best environmental practices (BEP).

(3) Measures in case of accidents

As provided in Article 23 of the Dioxins Law, businesses shall take emergency measures immediately when a large amount of dioxins is emitted into air or public water areas.

(4) Measurement on the status of pollution caused by dioxins

As provided in Article 28 of the Dioxins Law, businesses shall implement the measurement of the pollution status caused by dioxins, with regard to emissions from facilities subject to the emission standards and to effluents from facilities subject to the effluent standards. The results of such measurements shall be reported to prefectural governors.

(5) Appointment of pollution control supervisors etc.

Pursuant to the provisions of Act on Pollution Prevention Organization in Specified Factories (Law No.107 of 1971), businesses shall appoint pollution control supervisors and pollution control managers for facilities emitting dioxins. Appointed persons shall conscientiously implement their duties including monitoring how those facilities emitting dioxins are being operated, etc.

2. Report dioxins releases etc. by businesses

Pursuant to the provisions of the Law Concerning Reporting etc. of Releases to the Environment of Specific Chemicals Substances and Promoting Improvements in Their Management (Law No.86 of 1999), businesses shall report dioxins releases etc. in the acknowledgement that dioxins are Type I designated chemical substances under Paragraph 2 of Article 2 of the same law and could cause serious health damages.

In addition, businesses shall implement the management on the production, use, and other handling etc. of designated chemical substances including dioxins in accordance with the guidelines on measures regarding control of designated chemical substances etc. that businesses handling them should follow (guidelines for the management of chemical substances) stipulated in Article 3 of the same law, and shall also make efforts to reduce emissions by improving a system, preparing a guideline, inspecting and improving facilities etc., and also foster the general public's awareness of the actual status of the management of these chemicals and others.

3. Promotion of reducing, reuse and recycling of waste, etc. that could form dioxins

Pursuant to Article 11 of the Fundamental Law for Establishing a Sound Material-Cycle Society (Law No.110 of 2000, hereinafter referred as to "Recycling Law"), businesses shall minimize waste etc. that could release dioxins (refer to "waste etc." defined in Article 2, Paragraph 2 of the Recycling Law. The same shall apply hereinafter), by encouraging consideration in the process of development, manufacture, and distribution, self-restraint relating to the manufacture and sale of throwaway products and over-packaging, efforts to lengthen the life of products, etc. At the same time, businesses shall take necessary measures to promote the reuse or recycling of recyclable resources and shall cooperate with the national government or local public authorities in carrying out their policies and measures for establishing a sound material-cycle society.

In addition, pursuant to the provisions of the Waste Management and Public Cleansing Law (Law No.137 of 1970, hereafter referred to as "Waste Management Law"), businesses shall take necessary measures for minimizing waste such as formulating a plan to deal with business establishments generating a large amount of dioxins emissions, etc. Businesses shall also take measures in compliance with the Law for Promotion of Effective Use of Resources (Law No.48 of 1991), the Law for Promotion of Sorted Collection and Recycling of Containers and Packaging (Law No.112 of 1998), the Specified Household Instruments Recycling Law (Law No.97 of 1998), the Law Concerning the Recycling of Construction Materials (Law No.104 of 2000), the Law for Promoting the Recycling of Recyclable Food Resources, etc. (Law No.116 of 2000), the Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and other Entities (Law No.100 of 2000), the Law Concerning the Recycling etc. of End-of-Life Motor Vehicles (Law No.78 of 2002), etc. and shall further promote minimizing waste as well as the cyclical use of recyclable resources through their voluntary and active endeavors.

Section 3 Measures to be taken by the national government and local public authorities to promote the recycling and reuse of resources, and to reduce waste which could form dioxins

1. Promotion of measures for waste reduction

(1) Promotion of measures in compliance with the Recycling Law

Pursuant to Article 9 of the Recycling Law, the national government shall formulate the Basic Plan for

Establishing a Sound Material-Cycle Society pursuant to Article 15 of the Recycling Law. Based on the 3R (Reduce, Reuse, and Recycle) Initiative, adopted at a Ministerial Conference in June 2004, the national government shall further promote the reduction etc. of wastes.

Local public authorities, pursuant to Article 10 of the Recycling Law, shall not only implement necessary measures to ensure appropriate recycling and disposal of recyclable resources, but also formulate and implement the policies in accordance with the natural and social conditions of the local public authorities' jurisdiction, based on the proper role-sharing with the national government for establishing the sound material-cycle society.

(2) Promotion of measures in compliance with the Waste Management Law and other laws

Pursuant to the Basic Policy for comprehensive and systematic promotion of appropriate measures, including reduction of wastes (May 2001, Ministry of the Environment Notification No.34, hereinafter referred as to "Basic Policy"), in compliance with the provision of Article 5, 2. (1) of the Waste Management Law, the plan for improvement of waste disposal facilities established under the Basic Policy, the prefectural waste management program, and the municipal waste disposal program prescribing emission limitation measures for domestic wastes, the national government and local public authorities take necessary measures to minimize waste.

In addition, by formulating a basic policy and taking necessary steps in compliance with the Law for Promotion of Effective Utilization of Resources, the Law for Promotion of Sorted Collection and Recycling of Containers and Packaging, the Specified Household Instruments Recycling Law, the Law Concerning the Recycling of Construction Materials, the Law for Promoting the Recycling of Recyclable Food Resources, etc., the Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and other Entities, the Law Concerning the Recycling etc. of End-of-Life Motor Vehicles, the national government and local public authorities shall promote waste reduction and the cyclical use of recyclable resources.

(3) Assistance to equipment investment required for waste reduction

In order to reduce wastes, the national government shall provide financial and technological support to any person who has installed an improved facility for waste reduction or recycling.

2. Achievement of waste reduction targets

With the aim to achieve "waste reduction targets" established in accordance with the "Basic Guidelines of Japan for the Promotion of Measures against Dioxins (decided in March, 1999, at the ministerial conference on dioxins)", the government shall promote unified and systematic waste reduction measures.

3. Others

(1) Reduction and proper disposal of wastes from public facilities

The national government and local public authorities shall promote the reduction and proper disposal of wastes etc. from public facilities under the Basic Plan for Establishing a Sound Material-Cycle Society, the plan on measures for the national government to implement in order to restrict green house gas emissions etc. (National Government Action Plan) the national government formulates in accordance with Article 20, 2. (1) of the Act on Promotion of Global Warming Countermeasures (Law No.117 of 1998), and the plan on measures to restrict green house gas emission etc. (Local Government Action Plan) the prefectures and municipalities formulate in accordance with Article 20, 3. (1) of the act.

(2) Enhancement of environmental education/learning

Under the Recycling Law, the national government shall promote a wide range of integrated environmental education/learning, designed for cutting back on the amount of waste etc., including promotion of reduction, reuse and recycling of wastes etc. For this end, exchanges of personnel and information shall be promoted between the public sector and the private sector. The national government shall enhance the supply and diffusion of information, personnel training, and educational programs etc., in order to ensure that environmental education/learning including that designed to reduce waste etc. discharges within the family, at schools, in workplaces, in local communities, and any other places. etc. under the Law for Enhancing Motivation on Environmental Conservation and Promoting Environmental Education (Law No.130 of 2003). The local public authorities shall endeavor to plan and implement measures regarding the promotion of environmental education.

Section 4 Other matters necessary to reduce dioxins resulting from business activities in Japan

1. Appropriate and smooth implementation of the Stockholm Convention

In order to reduce the total emissions of dioxins under the provisions of Article 5 of the Stockholm Convention, the national government shall take necessary measures, including the establishment and implementation of the Action Plan and the promotion of use of best available techniques (BAT) and best environmental practices (BEP).

2. Promotion of measures for sources of dioxins

(1) Promotion of measures against waste

The national government and local public authorities shall enhance the controls on illegal waste disposal through the enforcement of more rigorous monitoring measures under the Waste Management Law, the Air Pollution Control Law (Law No.97 of 1968), and the Dioxins Law.

In accordance with the Dioxins Law, the national government and local public authorities shall

implement measures against soil pollution and also promote to implement or plan measures against sediment contamination, including removal of sediments.

The national government shall implement financial and technical assistance to local public authorities in installation of waste incinerators, and promote arrangement in such incinerators across wider areas. Furthermore, with respect to industrial waste incinerators, the national government shall improve model facilities by providing financial assistance for facilities improvement at waste disposal centers, and make further efforts to improve the sophistication of facilities by using financing mechanism of government-affiliated financial institutions.

Also, financial support is provided to the relevant local public authorities to appropriately promote the dismantling of general waste incinerators at the time of decommission, and encourage the effective reuse of vacant lots.

Prefectures shall provide advice etc. to municipalities to implement promptly a wide-area waste disposal facilities project formulated to enable the reduction of dioxins emissions associated with waste disposal.

(2) Promotion of measures against unregulated sources etc.

Of the sources specified in Annex C of the Stockholm Convention, the national government shall, in accordance with the provisions of Article 5 (d) of the Stockholm Convention, promote the use of BAT and BEP to new sources identified in the Action Plan, bearing in mind the guidelines on Best Available Techniques (BAT) and the guidance on Best Environmental Practices (BEP), (hereafter called “BAT and BEP guidelines” *) etc. and take appropriate measures under the law for ensuring the use of BAT.

Of the sources of dioxins not subject to control by the Dioxins Law and sources specified in Annex C of the Stockholm Convention, the national government and local public authorities shall systematically monitor the status of existing sources and new sources that are not specified in the Action Plan, and promote release reduction measures, taking into consideration the latest knowledge of emissions and the BAT and BEP guidelines.

Note*: Refers to the BAT and BEP guidelines adopted at the Conference of the Parties to the Stockholm Convention at its third session.

(3) Prohibition of open burning without using a proper incinerator

As provided in the Waste Management Law and the Offensive Odor Control Law (Law No.91 of 1971), open burning of waste, not using a proper incinerator, is prohibited.

3. Report of dioxins emissions etc.

(1) Publication of emission inventory of dioxins, etc.

The national government shall compile and publish an emission inventory of dioxins in waste incinerators etc. by sources and by media. In compiling the emissions inventory, emissions from main

generation sources of dioxins are estimated annually, while estimations are carried out for other generation sources every few years.

Local public authorities shall publish to the public the results of measurement conducted by businesses under Article 28 of the Dioxins Law.

(2) Implementation of monitoring and surveys on the actual status of dioxins emissions and implementation of measures based on the results

The government shall annually and continuously monitor the status of dioxins in the environment, human bodies, waste incinerators and industries in a systematic manner, and publish the results to the public in a way easy to understand.

Local public authorities shall implement surveys, including regular observation, in accordance with the provisions of the Dioxins Law. Based on the results of such surveys, the national government and local public authorities shall take appropriate measures as necessary under the Dioxins Law etc.

(3) Promotion of effective and efficient measurement and QA/QC

In order to promote effective and efficient measurement and monitoring, the national government shall promote the diffusion of such methods to introduce quick and inexpensive simplified analytical methods to appropriate fields under appropriate circumstances in accordance with their special characteristics.

The government shall promote QA/QC in dioxins measurement by providing standard environmental specimens, administering the Measurement Licensor Approval Program (MLAP), and spreading the Guidelines on QA/QC for the Environmental Measurement of Dioxins (Environmental Agency, November 2000) and the Guidelines on Securing the Reliability of the Environmental Measurements of Dioxins Commissioned Outside (Ministry of the Environment, March 2001).

The national government shall provide systematic training to technical experts working in official testing organizations of local public authorities etc. to help them enhance their understanding of analytical techniques and their skills for using the technologies.

4. Promotion of research and investigations and technological development activities regarding dioxins

The national government shall promote the analysis of the dioxins generation and emission mechanism, research on effects on organisms and behavior of dioxins in the environment, and development of technologies for appropriate incineration, detoxification, and decomposition of wastes, and also promote the introduction and diffusion of achievements of such technologies to push forward their use under appropriate circumstances.

5. Publication of accurate information and enhancement of disclosure to the general public

(1) Enhancement of publication and disclosure of information

The national government shall disclose and publish to the public accurate information concerning the impacts of dioxins on the human health and the environment, the results of research and development and international trends, including the relevant statistical data and their actual implications, in a prompt and easily understandable manner.

(2) Systematic activities designed to enhance public awareness

In order to effectively reduce wastes which result in emitting dioxins, it is essential for the public to recognize that people themselves generate wastes and impose burden on the environment and to reinforce their effort to reduce the environmental burden, including reducing wastes.

To ensure people's better understanding and their more cooperation in addressing issues of dioxins, the national government shall intensify its unified and systematic public awareness activities such as preparing an inter-ministerial pamphlet, issuing an annual report, which will enlighten the general public on the current situation and future agendas in national efforts toward the goal of building a recycling and reuse-oriented society.

The national government shall also make best efforts to provide accurate information on dioxins through the National Consumer Affairs Center, local consumption centers, its periodicals, the internet, and mass media etc. It shall also take every opportunity to encourage the public to review their senses of value and lifestyles and shift them to generate and discharge less waste.

[Reference] Dioxins emissions inventory

Source of dioxins emissions	Total amount of dioxins emission (g-TEQ/year)													
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Facilities subject to reduction targets	7676~8129	3691~4144	2870~3201	2390~2521	1895~2007	937~960	368~393	340~362	323~347	286~311	281~299	212~217	153~154	155~156
"Water"	13	12	12	9	4	3	2	2	2	2	3	1	1	2
1 Fields of waste disposal	7205~7658	3355~3808	2562~2839	2121~2252	1689~1801	748~771	219~244	215~237	213~237	193~218	181~199	132~137	102~103	94~95
"Water"	5	5	5	3	2	1	1	1	0	1	2	1	1	1
Municipal waste incinerators	5000	1550	1350	1019	812	370	71	64	62	54	52	42	36	33
Industrial waste incinerators	1505	1105	695	558	535	266	75	70	73	63	60	42	34	29
Small-scale waste incinerators (subject to laws)	-	-	-	326	158	79	37	38	31	25	24	30	19	19
Small-scale waste incinerators (exempt from laws)	700~1153	700~1153	517~848	218~349	184~296	33~56	35~60	43~64	47~70	50~76	45~63	18~23	13~14	13~14
2 Fields of industry	470	335	306	268	205	189	149	125	110	93	100	80	50	61
"Water"	6.3	5.8	5.8	5.0	1.8	1.2	0.9	1.0	1.0	0.8	0.8	0.5	0.3	0.6
Electric steel-making furnaces	229	140	142	131	95.3	94.8	80.3	64.0	49.6	39.5	50.2	33.0	20.1	30.1
Sintering facilities for steel industry	135	114	101	69.8	65.0	51.1	35.7	30.4	29.3	21.2	20.5	22.5	9.1	10.9
Facilities for recovering zinc	47.4	25.4	21.8	26.5	9.2	14.7	5.5	8.1	4.1	8.2	1.8	3.1	2.1	2.3
Facilities for manufacturing aluminum base alloy	31.0	28.8	23.1	22.2	19.7	16.3	17.4	13.0	15.2	12.9	15.6	11.3	11.1	8.7
Other facilities	27.3	26.2	18.6	18.6	16.2	11.6	10.3	9.7	11.4	10.7	11.7	9.9	7.7	8.8
3 Others	1.2	1.2	1.2	1.2	1.0	0.5	0.6	0.4	0.5	0.2	0.3	0.2	0.1	0.2
"Water"	1.2	1.2	1.2	1.2	1.0	0.5	0.6	0.4	0.5	0.2	0.3	0.2	0.1	0.2
Sewage disposal facilities	1.1	1.1	1.1	1.1	1.0	0.5	0.5	0.4	0.5	0.2	0.3	0.2	0.1	0.2
Waste disposal sites	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Facilities exempt from reduction targets	3.6~6.2	3.7~6.4	3.7~6.5	3.7~6.4	3.7~6.5	3.8~6.7	3.8~6.8	3.8~6.8	3.7~6.7	3.8~6.8	3.9~7.0	3.4~6.1	2.3~3.9	2.3~4.1
Crematoria	2.1~4.6	2.2~4.8	2.2~4.9	2.2~4.8	2.2~4.9	2.3~5.1	2.3~5.1	2.4~5.3	2.4~5.3	2.5~5.4	2.6~5.7	2.2~4.9	1.2~2.8	1.2~3.0
Cigarette smoke	0.1~0.2	0.1~0.2	0.1~0.2	0.1~0.2	0.1~0.2	0.1~0.2	0.1~0.2	0.1~0.2	0.1~0.2	0.1~0.2	0.1	0.1	0.1	0.1
Exhaust emissions from motor vehicles	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.2	1.2	1.2	1.1	1.0	1.0
Total	7680~8135	3695~4151	2874~3208	2394~2527	1899~2013	941~967	372~400	344~369	327~354	289~317	285~306	215~223	155~157	158~160
"Water"	13	12	12	9	4	3	2	2	2	2	3	1s	1	2

Note 1: WHO- TEF (1998) is used as the toxic equivalence factor for the calculation of emissions from 1997 to 2007. For emissions from 2008 to 2010, WHO- TEF (2006) is used to the extent possible.

Note 2: "Water" means amount released into water as part of releases.

Note 3: 0 (Zero) in the table is the result of rounding to the nearest whole number with amounts of dioxins emissions expressed in g-TEQ.

Note 4: It is considered that other sources of dioxins emissions that are not subject to this plan include "forest fire" "open burning". The amount of emissions to the air in FY2009 is estimated to be 0.06 g-TEQ/year. Also, "open burning" is prohibited in principle in Japan.