The State of Dioxin Accumulation in the Human Body, Blood, Wildlife, and Food: Findings of the Fiscal 1998 Survey

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Dioxins present serious issues for environmental protection, as they concern human health and other issues. Consequently, the government is now committed to a united effort to deal with these issues on the basis of the Basic Guidelines of Japan for the Promotion of Measures against Dioxins (adopted in March 1999) and the Law Concerning Special Measures Against Dioxins (approved and promulgated in July 1999).

The Environment Agency of Japan responded to this situation by implementing comprehensive monitoring of dioxins (Note 1) in the air, water, soil, and other environmental media throughout the country simultaneously in fiscal 1998. At the same time, it also implemented studies to grasp the actual state of dioxin accumulation in the human body, blood, wildlife, and food. The results of the comprehensive monitoring of dioxins in the air, water, soil, and other environmental media were compiled and publicly released in September 1999, and now this report presents findings in the other areas that have been compiled in their final form.

The findings of this survey may be summarized as follows:

I. As concerns dioxins in the human body, results from the survey of the mean values for accumulations in human internal organs in Japan show that the median (Note 2) toxicity equivalency quantity (TEQ) per weight of fat in adipose tissue, liver, testes and ovaries, and blood was 41–51 pg-TEQ/g fat, in the umbilical cord was 12 pg-TEQ/g fat, and in the brain was 2.0 pg-TEQ/g fat. The findings from a study comparing testicular weight and sperm production for different years of death show that testicular weight increased over the years 1964–1980, then started to decline somewhat from the first half of 1990s, but has since been increasing again. Sperm production levels were flat.

II. The concentration of dioxins in the blood was measured in a total of 253 people, including 234 residents of six normal environmental regions throughout Japan, and 19 residents of one region located in the vicinity of waste incineration facilities. The results for the normal environmental regions showed a mean value of 18 pg-TEQ/g fat, a median value of 17 pg-TEQ/g fat, and a range of 1.3–53 pg-TEQ/g fat. The survey conducted in the region located in the vicinity of waste incineration facilities showed a mean value of 17 pg-TEQ/g fat, a median value of 14 pg-TEQ/g fat, and a range of 5.9–38 pg-TEQ/g fat. Thus no significant difference was detected between the region located in the vicinity of waste incineration facilities and the normal environmental regions. For reference purposes, the corresponding figures for the total of 253 subjects were a mean value of 18 pg-TEQ/g fat, a median value of 17 pg-TEQ/g fat, and a range of 1.3–53 pg-TEQ/g fat.

III. The accumulation of dioxins in wildlife (fish, amphibians, birds, marine mammals, and land mammals) was studied as one indicator of environmental pollution. The results show that predators higher in the food chain in the ecosystem tend to have greater accumulations of dioxins than predators lower in the food chain. Terrestrial organisms had relatively high accumulations of PCDDs and PCDFs, while marine organisms tended to have higher accumulations of co-planar PCBs.

IV. A survey of foods was implemented in fiscal 1997 and 1998 by the collection of food samples obtained using the duplicate method. A total of 48 samples were experimentally measured for brominated dioxins as well as for chlorinated dioxins (hereafter dioxins) for reference purposes. The results were as follows:

Brominated dioxins were at levels below the lower limit of determination in all samples analyzed.

The total daily intake of dioxins in fiscal 1997 was a mean value (Note 3) of 0.81 pg-TEQ/kg body weight, and the median value was 0.42 pg-TEQ/kg body weight, over a range of 0.015–4.8 pg-TEQ/kg body weight. In fiscal 1998, the mean value was 0.94 pg-TEQ/kg body weight, the median value was 0.78 pg-TEQ/kg body weight, and the range was 0.0070–3.6 pg-TEQ/kg body weight. Combining the values for fiscal 1997 and 1998, the mean value was 0.88 pg-TEQ/kg body weight, the median value was 0.65 pg-TEQ/kg body weight, and the range was 0.0070–4.8 pg-TEQ/kg body weight.

Notes

1 Here, the term "Dioxins" refers collectively to polychlorinated dibenzo-p-dioxins (hereafter PCDDs), polychlorinated dibenzofurans (hereafter PCDFs), and co-planar polychlorinated biphenyls (hereafter co-planar PCBs).

2 The “median values” are the values in the exact middle when data are listed according to magnitude.

3 Here “mean values” signify arithmetic means.

I. Findings of the Survey of the State of Dioxin Accumulation in the Human Body

Summary

As concerns the human body, the results from the survey of mean values of dioxin accumulation in human internal organs in Japan show that the median toxicity per weight of fat in adipose tissue, liver, testes and ovaries, and blood was 41–51 pg-TEQ/g fat, and in the brain alone was 2.0 pg-TEQ/g fat. The survey showed accumulations in the umbilical cord of 12 pg-TEQ/g fat (according to WHO TEF, 1998).

In addition, the findings from a survey comparing testicular weight and sperm production for different years of death show that testicular weight increased over the years 1964–1980, then started to decline somewhat from the first half of 1990s, but has since been increasing again. Sperm production levels were flat.

1. Background

The impact of dioxins on human beings and ecosystems has become a matter public concern in recent years.

With regard to human beings, the people of Japan have felt particular uneasiness over the possibility that (1) extremely minute quantities of dioxins may have an impact on human health, (2) effects may be passed on to the next generation through the mother's body, and (3) dioxins may be causing lowered sperm counts and other reproductive abnormalities.

Accordingly, the Environment Agency formed research teams consisting of specialists in anatomy, forensic medicine, pathology, obstetrics and gynecology, public health, analytical chemistry, and other such fields to conduct surveys on these problems. The surveys examined (1) mean values of dioxin concentration in the internal organs of Japanese adults, and (2) the state of testicular weight and sperm production.

2. Summary of Research

(1) Survey of Dioxins in Internal Organs

(a) Survey Method

Dioxin levels taken from autopsy records and measured in cadaveric internal organs were used to grasp the average state of the internal organs in order to ascertain the mean values of dioxin accumulation in the Japanese people.

○ Subjects

The subjects were 22 men and women aged 20–50 studied within 24–48 hours of death (without regard to cause of death).

As thorough measures had not initially been taken at government autopsy facilities to obtain the consent of surviving relatives for this survey, the internal organs for which consent had not been obtained were ultimately returned. Therefore, the survey used only cadaveric internal organs acquired at the Tokyo Metropolitan Medical Examiner's Office after obtaining the consent of surviving relatives.

The subjects for this survey were further limited to those for whom the medical examiners had explained to surviving relatives the purposes of the survey and obtained their cooperation, and who during their lives had smoked no more than 20 cigarettes and drunk no more than about 541 mL of alcohol (3 *go* of Japanese *sake*) daily.

Persons who had been malnourished and for whom their history of residence could not be established were not included as survey subjects.

○ Internal Organs Studied (per Subject)

Liver (approximately 100 g), adipose tissue (subcutaneous abdominal fat, approximately 10 g), blood (whole blood, approximately 100 ml), brain (from the area near the hypothalamus, approximately 20 g), testes or ovaries (both sides).

Adipose tissue could not be obtained in one case, and reliable analytical results of gonads could not be obtained in five cases, so these were excluded from the survey results.

○ Items Measured

Dioxins: Concentration and toxicity

○ Analysis Method

See the report.

○ Calculation Method

By fat weight and wet weight.

Isomers that were detected at levels below the lower limit of determination were assigned zero value.

However, concentrations below the lower limit of determination were converted to TEQ values equivalent to the lower limit of determination or half of that lower limit and included in a separate table for reference.

(b) Findings

See appended materials.

○ Evaluation of the median toxicity (TEF, WHO TEF 1998) of dioxins in each internal organ showed:

-Dioxins per fat weight in the internal organs (units: pg-TEQ/g fat) were as follows: liver (51), blood (49), adipose tissue (44), testes or ovaries (41), brain (2.0).

Internal organs apart from the brain showed similar values in the 41–51 range, while the brain showed the value of 2.0, extremely low compared to the other organs.

-Dioxins per wet weight in the internal organs (units: pg-TEQ/g wet weight) were as follows: adipose tissue (33), liver (3.7), testes or ovaries (0.87), brain (0.24), blood (0.17).

The concentrations in the different organs corresponded roughly to their fat content, so that organs that are high in fat tended to show higher concentrations of dioxins. However, the brain showed extremely low levels even though it contains about the same amount of fat as the liver.

○ The toxicity of dioxins in the various organs tended to increase with the age of the subject.

○ Comparing the concentration of dioxins in the blood with that in the other organs by fat weight, the blood:liver ratio (r) was 0.6089, blood:adipose tissue 0.5963, blood:brain 0.3964, and blood:gonad 0.1999.

○ The proportion of PCDDs and PCDFs to co-planar PCBs in terms of toxicity was roughly equal in the adipose tissue and the testes and ovaries, but PCDDs and PCDFs were slightly higher in the liver and blood.

○ The PCDD and PCDF isomers with the highest concentrations (mass basis) by their median values were OCDD, 1234678-HpCDD, and 123678HxCDD, in that order. In the co-planar PCBs, they were 23'44'5-PeCB (#118) and 233'44'5'-HxCB (#156).

(2) Survey of Dioxins in the Umbilical Cord

(a) Survey Method

The dioxins were measured in samples taken from umbilical cords obtained with the mothers' consent before they gave birth at medical institutions.

○ Subjects

The subjects were 29 persons (4 specimens of PCDDs and PCDFs, 13 specimens of co-planar PCBs)

○ Items Measured

Dioxins: Concentration and toxicity

In the case of PCDDs and PCDFs, analysis of umbilical cords alone showed extremely low concentrations, mostly below the lower limit of determination. Therefore samples from 7–8 subjects were measured together. In the case of co-planar PCBs, samples from the first 10 subjects were measured separately, and from the eleventh subject on, samples from 7–8 subjects were measured together.

○ Analysis Method

See the report.

○ Calculation Method

By wet weight and fat weight.

Isomers that were detected at levels below the lower limit of determination were assigned zero value.

However, concentrations below the lower limit of determination were converted to TEQ values equivalent to the lower limit of determination or half of that lower limit and included in a separate table for reference.

(b) Findings

See appended materials.

Evaluation of the median toxicity (TEF, WHO TEF 1998) of dioxins in the umbilical cords showed a level by fat weight of 12 pg-TEQ/g fat. This value was low compared to those for the internal organs (except the brain) surveyed in part (1). The value by wet weight was 0.026 pg-TEQ/g wet weight.

(3) Survey of Testes (Testicular Weight, Pathology)

(a) Survey Method

Testicular weight was surveyed from autopsy records of adult males collected at government autopsy facilities, and a morphological study of sperm production was also carried out using histopathological specimens of cadaveric testicular tissue that had already been prepared.

○ Subjects

-Testicular Weight Survey:

13,185 subjects who died at ages 20–69 during the years 1949–1998

-Testicular Pathology Survey (State of Sperm Production)

697 subjects who died at ages 20–69 during the years 1978–1998

○ Measurement Method

Johnsen's score count (see the report)

(b) Findings

See appended materials.

According to a 1997 report from Finland, a comparison of sperm production in 1981 and 1991 by year of death showed that sperm production had decreased. The below items were compared by year of death in order to verify those findings:

○ Testicular Weight

Height, weight, and liver weight showed increases over time, and testicular weight increased from 1964 to about 1980, then decreased somewhat in the first half of 1990s but subsequently has been increasing again.

Since the present survey conducted comparisons by year of death, it is to be hoped that a future survey can base its analysis upon the year of birth.

○ Pathological Survey (State of Sperm Production)

Histopathological study of testicular tissue showed that the proportion of sperm production results that could be considered normal remained level over the 20-year period surveyed, as also did the proportion judged as deficient sperm production over the same period.

3. Future Continuation of this Research

The survey of internal organs conducted for this survey utilized human remains on which medical examiners had conducted autopsies for the purpose of determining cause of death under the Autopsy Law (hereafter referred to as government autopsies). These were used in order to determine the state of dioxin accumulation in the Japanese people from cadaveric internal organs. The use of human remains for research on internal organs involves social and ethical issues of human dignity. The survey was planned to determine the state of dioxin accumulation in human beings while taking full cognizance of the careful consideration that must be shown in conducting such research.

At the start of this survey researchers made efforts to obtain the consent of surviving relatives regarding survey to the extent possible in order to accord them the proper respect. There were cases, however, where practical problems made it difficult to obtain the consent of surviving relatives, as a result of which this requirement was not fully met in some of the cases.

For the future continuation of this research, scrutiny is being given the debate among academic societies concerned regarding procedures for obtaining the consent of surviving relatives in cases when cadaveric internal organs from government autopsies are to be used in research for environmental consideration. However, it is not presently possible to form an immediate social consensus on this matter. Therefore, the Environment Agency has for its part decided, on the basis of considerations including full consultation with the parties who participated in this research, to suspend for the time being the continuation of this survey into dioxins using cadaveric internal organs from government autopsies.

Table 1　Dioxin concentration and TEQ in internal organs (summary)

			per fat weight			per wet weight		
			unit	mean	median	unit	mean	median
liver(n=22)	PCDD+PCDF	Total PCDDs	pg/g(fat)	760	670	pg/g(wet)	59	55
		Total PCDFs	pg/g(fat)	150	120	pg/g(wet)	10	11
		Total PCDD/DFs	pg/g(fat)	910	790	pg/g(wet)	69	68
		Total TEQ[1]	pg-TEQ/g(fat)	36	34	pg-TEQ/g(wet)	2.9	2.6
		Total TEQ[2]	pg-TEQ/g(fat)	36	34	pg-TEQ/g(wet)	2.9	2.6
		Total TEQ[3]	pg-TEQ/g(fat)	36	34	pg-TEQ/g(wet)	2.9	2.6
	Co-PCB	Total TEQ[1]	pg-TEQ/g(fat)	21	19	pg-TEQ/g(wet)	2.2	1.0
		Total TEQ[2]	pg-TEQ/g(fat)	21	19	pg-TEQ/g(wet)	2.2	1.0
		Total TEQ[3]	pg-TEQ/g(fat)	21	19	pg-TEQ/g(wet)	2.2	1.0
	PCDD+PCDF+ Co-PCB	Total TEQ[1]	pg-TEQ/g(fat)	57	51	pg-TEQ/g(wet)	5.1	3.7
		Total TEQ[2]	pg-TEQ/g(fat)	57	51	pg-TEQ/g(wet)	5.1	3.7
		Total TEQ[3]	pg-TEQ/g(fat)	57	51	pg-TEQ/g(wet)	5.1	3.7
adipose tissure (n=21)	PCDD+PCDF	Total PCDDs	pg/g(fat)	340	210	pg/g(wet)	280	180
		Total PCDFs	pg/g(fat)	53	37	pg/g(wet)	44	31
		Total PCDD/DFs	pg/g(fat)	390	250	pg/g(wet)	320	210
		Total TEQ[1]	pg-TEQ/g(fat)	23	19	pg-TEQ/g(wet)	19	16
		Total TEQ[2]	pg-TEQ/g(fat)	23	19	pg-TEQ/g(wet)	19	16
		Total TEQ[3]	pg-TEQ/g(fat)	23	19	pg-TEQ/g(wet)	19	16
	Co-PCB	Total TEQ[1]	pg-TEQ/g(fat)	23	18	pg-TEQ/g(wet)	19	14
		Total TEQ[2]	pg-TEQ/g(fat)	23	18	pg-TEQ/g(wet)	19	14
		Total TEQ[3]	pg-TEQ/g(fat)	23	18	pg-TEQ/g(wet)	19	14
	PCDD+PCDF+ Co-PCB	Total TEQ[1]	pg-TEQ/g(fat)	46	44	pg-TEQ/g(wet)	37	33
		Total TEQ[2]	pg-TEQ/g(fat)	46	44	pg-TEQ/g(wet)	37	33
		Total TEQ[3]	pg-TEQ/g(fat)	46	44	pg-TEQ/g(wet)	37	33
blood (n=22)	PCDD+PCDF	Total PCDDs	pg/g(fat)	510	410	pg/g(wet)	1.9	1.6
		Total PCDFs	pg/g(fat)	88	90	pg/g(wet)	0.33	0.33
		Total PCDD/DFs	pg/g(fat)	610	530	pg/g(wet)	2.3	1.8
		Total TEQ[1]	pg-TEQ/g(fat)	31	29	pg-TEQ/g(wet)	0.12	0.11
		Total TEQ[2]	pg-TEQ/g(fat)	32	31	pg-TEQ/g(wet)	0.12	0.11
		Total TEQ[3]	pg-TEQ/g(fat)	33	33	pg-TEQ/g(wet)	0.12	0.12
	Co-PCB	Total TEQ[1]	pg-TEQ/g(fat)	19	16	pg-TEQ/g(wet)	0.082	0.068
		Total TEQ[2]	pg-TEQ/g(fat)	19	16	pg-TEQ/g(wet)	0.082	0.068
		Total TEQ[3]	pg-TEQ/g(fat)	19	16	pg-TEQ/g(wet)	0.082	0.068
	PCDD+PCDF+ Co-PCB	Total TEQ[1]	pg-TEQ/g(fat)	52	49	pg-TEQ/g(wet)	0.21	0.17
		Total TEQ[2]	pg-TEQ/g(fat)	52	49	pg-TEQ/g(wet)	0.21	0.17
		Total TEQ[3]	pg-TEQ/g(fat)	52	49	pg-TEQ/g(wet)	0.21	0.17
brain (n=22)	PCDD+PCDF	Total PCDDs	pg/g(fat)	13	11	pg/g(wet)	1.3	1.2
		Total PCDFs	pg/g(fat)	2.6	1.6	pg/g(wet)	0.24	0.20
		Total PCDD/DFs	pg/g(fat)	16	13	pg/g(wet)	1.5	1.4
		Total TEQ[1]	pg-TEQ/g(fat)	0.87	0.63	pg-TEQ/g(wet)	0.092	0.050
		Total TEQ[2]	pg-TEQ/g(fat)	1.3	1.2	pg-TEQ/g(wet)	0.14	0.11
		Total TEQ[3]	pg-TEQ/g(fat)	1.8	1.4	pg-TEQ/g(wet)	0.18	0.16
	Co-PCB	Total TEQ[1]	pg-TEQ/g(fat)	1.9	1.5	pg-TEQ/g(wet)	0.19	0.15
		Total TEQ[2]	pg-TEQ/g(fat)	1.9	1.5	pg-TEQ/g(wet)	0.19	0.15
		Total TEQ[3]	pg-TEQ/g(fat)	1.9	1.5	pg-TEQ/g(wet)	0.19	0.15
	PCDD+PCDF+ Co-PCB	Total TEQ[1]	pg-TEQ/g(fat)	2.8	2.0	pg-TEQ/g(wet)	0.28	0.24
		Total TEQ[2]	pg-TEQ/g(fat)	3.2	2.9	pg-TEQ/g(wet)	0.33	0.29
		Total TEQ[3]	pg-TEQ/g(fat)	3.7	3.7	pg-TEQ/g(wet)	0.37	0.35
testes, ovary (n=17)	PCDD+PCDF	Total PCDDs	pg/g(fat)	350	230	pg/g(wet)	6.3	4.9
		Total PCDFs	pg/g(fat)	54	42	pg/g(wet)	1.1	0.81
		Total PCDD/DFs	pg/g(fat)	400	270	pg/g(wet)	7.4	5.7
		Total TEQ[1]	pg-TEQ/g(fat)	29	19	pg-TEQ/g(wet)	0.54	0.45
		Total TEQ[2]	pg-TEQ/g(fat)	29	22	pg-TEQ/g(wet)	0.56	0.45
		Total TEQ[3]	pg-TEQ/g(fat)	30	22	pg-TEQ/g(wet)	0.57	0.48
	Co-PCB	Total TEQ[1]	pg-TEQ/g(fat)	23	20	pg-TEQ/g(wet)	0.48	0.36
		Total TEQ[2]	pg-TEQ/g(fat)	23	20	pg-TEQ/g(wet)	0.48	0.36
		Total TEQ[3]	pg-TEQ/g(fat)	23	20	pg-TEQ/g(wet)	0.48	0.36
	PCDD+PCDF+ Co-PCB	Total TEQ[1]	pg-TEQ/g(fat)	51	41	pg-TEQ/g(wet)	1.0	0.87
		Total TEQ[2]	pg-TEQ/g(fat)	53	42	pg-TEQ/g(wet)	1.0	0.87
		Total TEQ[3]	pg-TEQ/g(fat)	53	42	pg-TEQ/g(wet)	1.1	0.88

WHO-TEF: Toxicity Equivalency Factor (WHO, 1998) is applied.

1: Total TEQ calculated applying 0 as the concentration for the isomers below the detection limit.

2: Total TEQ calculated applying 1/2 value of the detection limit as the concentration for the isomers below the detection limit.

3: Total TEQ calculated applying the value of the detection limit as the concentration for the isomers below the detection limit.

Table 2　Dioxin concentraton in umbilical cord (summary)

		mean	median
fat concentration	% (w/w)	0.1096	0.105
concentration per fat weight	unit		
PCDDs+PCDFs	pg/g (fat)	270	240
PCDDs+PCDFs WHO-TEQ1	pg-TEQ/g (fat)	10	11
PCDDs+PCDFs WHO-TEQ2	pg-TEQ/g (fat)	11	12
PCDDs+PCDFs WHO-TEQ3	pg-TEQ/g (fat)	13	12
COPCBs WHO-TEQ1	pg-TEQ/g (fat)	6.6	3.0
COPCBs WHO-TEQ2	pg-TEQ/g (fat)	7.7	6.1
COPCBs WHO-TEQ3	pg-TEQ/g (fat)	8.7	7.9
Total WHO-TEQ1 (PCDD+DF+COPCB)	pg-TEQ/g (fat)	14	12
Total WHO-TEQ2 (PCDD+DF+COPCB)	pg-TEQ/g (fat)	14	12
Total WHO-TEQ3 (PCDD+DF+COPCB)	pg-TEQ/g (fat)	15	13
concentration per wet weight			
PCDDs+PCDFs	pg/g (wet)	0.437	0.38
PCDDs+PCDFs WHO-TEQ^1	pg-TEQ/g (wet)	0.019	0.015
PCDDs+PCDFs WHO-TEQ^2	pg-TEQ/g (wet)	0.020	0.016
PCDDs+PCDFs WHO-TEQ^3	pg-TEQ/g (wet)	0.021	0.017
COPCBs WHO-TEQ^1	pg-TEQ/g (wet)	0.0087	0.0056
COPCBs WHO-TEQ^2	pg-TEQ/g (wet)	0.0098	0.0071
COPCBs WHO-TEQ^3	pg-TEQ/g (wet)	0.011	0.0080
Total WHO-TEQ1 (PCDD+DF+COPCB)	pg-TEQ/g (wet)	0.034	0.026
Total WHO-TEQ2 (PCDD+DF+COPCB)	pg-TEQ/g (wet)	0.036	0.027
Total WHO-TEQ3 (PCDD+DF+COPCB)	pg-TEQ/g (wet)	0.036	0.027

WHO-TEF : Toxicity Equivalency Factor (WHO, 1998) is applied

WHO-TEQ^1 : Total TEQ calculated applying 0 as the concentration for the isomers below the detection limit.

WHO-TEQ^2 : Total TEQ calculated applying 1/2 value of the detection limit as the concentration for the isomers below the detection limit.

WHO-TEQ^3 : Total TEQ calculated applying the value of the detection limit as the concentration for the isomers below the detection limit.

Note: pg/g(fat); concentration per fat weight.　pg-TEQ/g(fat); TEQ per fat weight.
pg/g(wet); concentration per wet weight.　pg-TEQ/g(wet); TEQ per wet weight

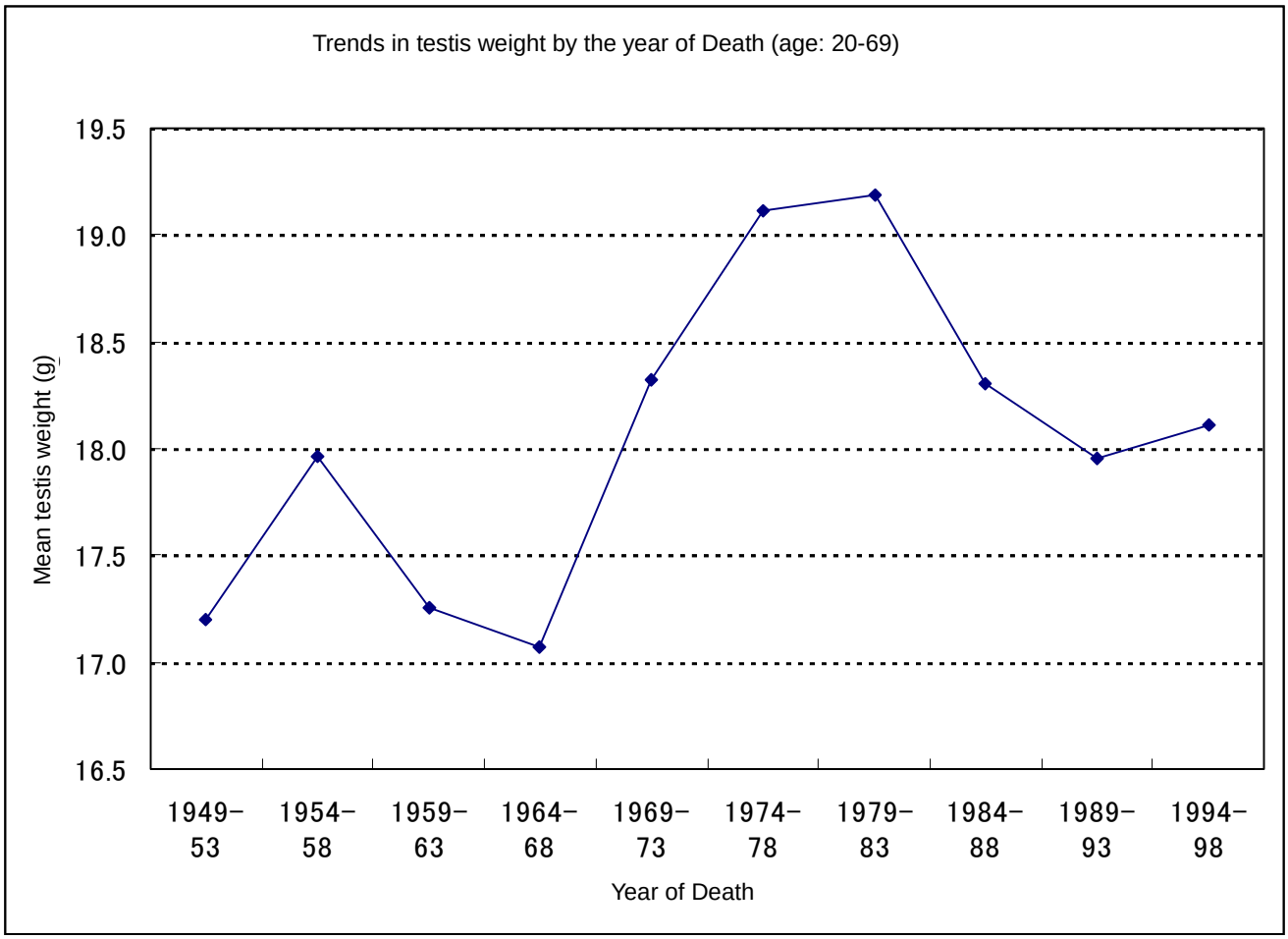


Fig.1　Change in Testis Weight in Japanese

Table 3　Histological Examination Results of Testis

Age: 20 to 69

Year	Arrest	Fair	Normal	N
1978	21.3% (16)	21.3% (16)	57.3% (43)	75
1988	28.1% (68)	15.7% (38)	56.2% (136)	242
1993	31.1% (41)	16.7% (22)	52.3% (69)	132
1998	26.6% (66)	14.5% (36)	58.9% (146)	248
Total	27.4% (191)	16.1% (112)	56.5% (394)	697

Age:20 to 39

Year	Arrest	Fair	Normal	N
1978	7.4% (2)	18.5% (5)	74.1% (20)	27
1988	14.3% (8)	8.9% (5)	76.8% (43)	56
1993	13.3% (2)	13.3% (2)	73.3% (11)	15
1998	14.7% (5)	8.8% (3)	76.5% (26)	34
Total	12.9% (17)	11.4% (15)	75.8% (100)	132

Age: 35 to 69

Year	Arrest	Fair	Normal	N
1978	25.4% (15)	22.0% (13)	52.5% (31)	59
1988	31.7% (63)	17.1% (34)	51.3% (102)	199
1993	32.8% (40)	16.4% (20)	50.8% (62)	122
1998	28.3% (63)	15.2% (34)	56.5% (126)	223
Total	30.0% (181)	16.7% (101)	53.2% (321)	603

Note: Actual numbers examined are shown in ().

II. Findings of the Survey of Dioxins in the Blood in Normal Environmental Regions, Etc.

The concentration of dioxins in the blood was measured for a total of 253 subjects (122 women and 131 men), including 234 residents (113 women and 121 men) of six normal environmental regions (Note 1) throughout Japan, and 19 residents (9 women and 10 men) of one region located in the vicinity of waste incineration facilities.

In summary, the results from the total of 234 subjects in normal environmental regions showed a mean value of 18 pg-TEQ/g fat, a median value of 17 pg-TEQ/g fat, and a range of 1.3–53 pg-TEQ/g fat.

The survey conducted on a total of 19 subjects from the region located in the vicinity of waste incineration facilities showed a mean value of 17 pg-TEQ/g fat, a median value of 14 pg-TEQ/g fat, and a range of 5.9–38 pg-TEQ/g fat. Thus no significant difference was detected between the region located in the vicinity of waste incineration facilities and the normal environmental regions.

For reference purposes, the corresponding overall figures for the total of 253 subjects were a mean value of 18 pg-TEQ/g fat, a median value of 17 pg-TEQ/g fat, and a range of 1.3–53 pg-TEQ/g fat.

The findings from this survey cannot be compared easily with those from other surveys because the analytical methods are not necessarily the same. Overall, however, comparison shows that generally the same trends appear in these results as in those from preceding surveys implemented in Japan and other countries.

Note

1 Here, normal environmental region means regions that have no waste incineration facility within about 2 km and are not considered to be subject to any special environmental exposure.

The Environment Agency has collected baseline data for ascertaining the state of human exposure to dioxins in Japan by means of the title survey of dioxin concentrations in the blood conducted by the Environmental Health Department in fiscal 1998 on the residents of six normal environmental regions and other regions throughout Japan. The findings of this survey have recently been compiled.

The views of specialists on the attached materials were sought in the process of assembling this survey's findings.

1. Survey Content

(1) Objectives

The concentration of dioxins in blood was measured in order to obtain baseline data for ascertaining the state of human exposure to dioxins in normal environmental regions and other regions of Japan.

(2) Regions and Subjects Surveyed

(a) Survey Regions

Six regions throughout Japan were selected as normal environmental regions that "have no waste incineration facility within about 2 km and are not considered to be subject to any special environmental exposure."

In addition, one region was selected that is within about 2 km of waste incineration facilities.

Normal environmental regions: Six regions throughout Japan, with total of 234 subjects (113 women, 121 men)

Regions located in the vicinity of waste incineration facilities: One region, with total of 19 subjects (9 women, 10 men)

Total of 243 subjects (122 women, 131 men)

(b) Survey Subjects

As a rule, about 40 people (about 8 each from five age groups of 20s, 30s, 40s, 50s, and 60s and above, with about equal numbers of men and women from each) who meet the following conditions were recruited from each region (Table 1):

- ○ Subjects who have lived in the region for at least ten years
- ○ Subjects who are not thought to have experienced occupational exposure (workers at waste incineration facilities, etc.)
- ○ Ages 20–65

(c) Items Surveyed

Dioxins, etc. in the blood (Regarding isomers and toxic equivalency factors (WHO TEF, 1998), see Table 2.)

Figures below the lower limit of determination (ND) were assigned zero value, and ND was converted to values equivalent to half of the lower limit of determination and included separately for reference.

The lower limits of determination for dioxin isomers were: 1 pg/g-fat for 4,5 chlorinated dioxins, 2 pg/g-fat for 6,7 chlorinated dioxins, 4 pg/g-fat for 8 chlorinated dioxins, and 10 pg/g-fat for co-planar PCBs.

(d) Survey Period

February–March 1999

2. Findings

The results of measurements are shown in Table 3.

Overview of Findings

(Figures in brackets are ND levels converted to half of the lower limit of determination.)

(1) In the normal environmental regions, blood from a total of 234 subjects was studied, and the mean value of dioxin concentration was 18 (19) pg-TEQ/g fat, the median value was 17 (18) pg-TEQ/g fat, and the range was 1.3–53 (3.6–53) pg-TEQ/g fat.

In the regions located in the vicinity of waste incineration facilities, blood from a total of 19 subjects was surveyed, and the mean value of dioxin concentration was 17 (18) pg-TEQ/g fat, the median value was 14 (14) pg-TEQ/g fat, and the range was 5.9–38 (7.5–38) pg-TEQ/g fat.

No significant difference was detected between the region located in the vicinity of waste incineration facilities and the normal environmental regions.

For reference purposes, the corresponding figures for the total of 253 subjects were a mean value of 18 (19) pg-TEQ/g fat, a median value of 17 (17) pg-TEQ/g fat, and a range of 1.3–53 (3.6–53) pg-TEQ/g fat.

(2) In addition, the difference between mean values for men and women (gender difference), different ages, and the number of years since birth were analyzed statistically in relation to the concentration of dioxins in the blood. No particularly significant gender difference was found (Table 4), and the correlation coefficients for the latter items were 0.45–0.50 (Table 5).

Evaluation of Findings

The dioxin levels in the blood measured by this survey cannot be compared easily with those from other surveys because the conditions of measurement, the preparation methods, and so on were not the same. Overall, however, comparison shows that generally the same trends appear in these results as in those from earlier surveys (see note) implemented in Japan and other countries.

Note: *Findings of Fiscal 1998 Survey on Long-Term Impact of Exposure to Dioxins in the Air* (Environment Agency of Japan, released August 1999), *Report on Findings of Fiscal 1997 Health Sciences Research* (Ministry of Health and Welfare, released 1998), *Report on Findings of Fiscal 1998 Health Sciences Research* (Ministry of Health and Welfare, released November 1999), etc.

3. Conclusions

This survey obtained baseline data on the concentration of dioxins in the blood of people in normal environmental regions in Japan.

It will be necessary in the future to carry out a comprehensive analysis of this survey in combination with the

questionnaire survey on life histories that was conducted at the same time as well as with other related data.

List of members (omitted)

Table 1　Composition of Subjects (1)

	All Regions		Normal Regions		Waste Incinerator Vicinity Region	
Age Group / Sex	Male	Female	Male	Female	Male	Female
20's	26	24	24	22	2	2
30's	23	27	23	25	0	2
40's	29	23	25	22	4	1
50's	27	23	26	21	1	2
60's	26	25	23	23	3	2
Sub-total	131	122	121	113	10	9
Total	253		234		19	

Table 1　Composition of Subjects (2)

	Normal Regions												Waste Incinerator Vicinity Region	
	Region A		Region B		Region C		Region D		Region E		Region F		Region G	
Sex	M	F	M	F	M	F	M	F	M	F	M	F	M	F
20's	4	5	4	2	4	5	5	5	2	0	5	5	2	2
30's	4	3	4	4	4	5	4	5	3	3	4	5	0	2
40's	4	5	4	3	4	4	5	5	3	1	5	4	4	1
50's	3	4	9	3	4	5	5	5	0	0	5	4	1	2
60's	4	3	4	3	4	5	4	5	3	3	4	4	3	2
Sub-total	19	20	25	15	20	24	23	25	11	7	23	22	10	9
Total	39		40		44		48		18		45		19	

Table 2　Isomers Measured

	No. of Chlorines	Isomers	TEF	
			I-TEF(1988) WHO/IPCS-TEF(1993)※	WHO-TEF1998
PCDD	4	1,3,6,8-T_4CDD	－	－
		1,3,7,9-T_4CDD	－	－
		2,3,7,8-T_4CDD	1	1
	5	1,2,3,7,8-P_5CDD	0.5	1
	6	1,2,3,4,7,8-H_6CDD	0.1	0.1
		1,2,3,6,7,8-H_6CDD	0.1	0.1
		1,2,3,7,8,9-H_6CDD	0.1	0.1
	7	1,2,3,4,6,7,8-H_7CDD	0.01	0.01
	8	1,2,3,4,6,7,8,9-O_8CDD	0.001	0.0001
PCDF	4	1,2,7,8-T_4CDF	－	－
		2,3,7,8-T_4CDF	0.1	0.1
	5	1,2,3,7,8-P_5CDF	0.05	0.05
		2,3,4,7,8-P_5CDF	0.5	0.5
	6	1,2,3,4,7,8-H_6CDF	0.1	0.1
		1,2,3,6,7,8-H_6CDF	0.1	0.1
		1,2,3,7,8,9-H_6CDF	0.1	0.1
		2,3,4,6,7,8-H_6CDF	0.1	0.1
	7	1,2,3,4,6,7,8-H_7CDF	0.01	0.01
		1,2,3,4,7,8,9-H_7CDF	0.01	0.01
	8	1,2,3,4,6,7,8,9-O_8CDF	0.001	0.0001
Coplanar PCB	Non-ortho	3,4,4',5-T_4CB	－	0.0001
		3,3',4,4'-T_4CB	0.0005	0.0001
		3,3',4,4',5-P_5CB	0.1	0.1
		3,3',4,4',5,5'-H_6CB	0.01	0.01
	Mono-ortho	2',3,4,4',5-P_5CB	0.0001	0.0001
		2,3',4,4',5-P_5CB	0.0001	0.0001
		2,3,3',4,4'-P_5CB	0.0001	0.0001
		2,3,4,4',5-P_5CB	0.0005	0.0005
		2,3',4,4',5,5'-H_6CB	0.00001	0.00001
		2,3,3',4,4',5-H_6CB	0.0005	0.0005
		2,3,3',4,4',5'-H_6CB	0.0005	0.0005
		2,3,3',4,4',5,5'-H_7CB	0.0001	0.0001
	Di-ortho	2,2',3,4,4',5,5'-H_7CB	0.00001	－
		2,2',3,3',4,4',5-H_7CB	0.0001	－

※ PCDDs and PCDFs follow I-TEF(1988), Coplanar PCBs follow WHO/ICPS-TEF(1993)

Table 3　Concentrations of PCDDs, PCDFs and Co-PCBs in Blood (pg-TEQ/g fat)

	All Regions	Normal Regions	Waste Incinerator Vicinity Region
n	253	234	19
Age			
mean	44	44	47
sd	14	13	16
median	44	44	47
range	20 ～ 76	20 ～ 69	22 ～ 76
PCDD+PCDF			
mean	11	11	9.2
s. d.	5.6	5.7	4.2
median	9.8	10	8.8
range	0.91 ～ 33	0.91 ～ 33	4.0 ～ 17
Co-PCB			
mean	7.3	7.3	8.1
s. d.	5.4	5.3	6.1
median	5.9	5.8	6.0
range	0.33 ～ 32	0.33 ～ 32	1.1 ～ 22
PCDD+PCDF+Co-PCB			
mean	18	18	17
s. d.	10	10	9.6
median	17	17	14
range	1.3 ～ 53	1.3 ～ 53	5.9 ～ 38

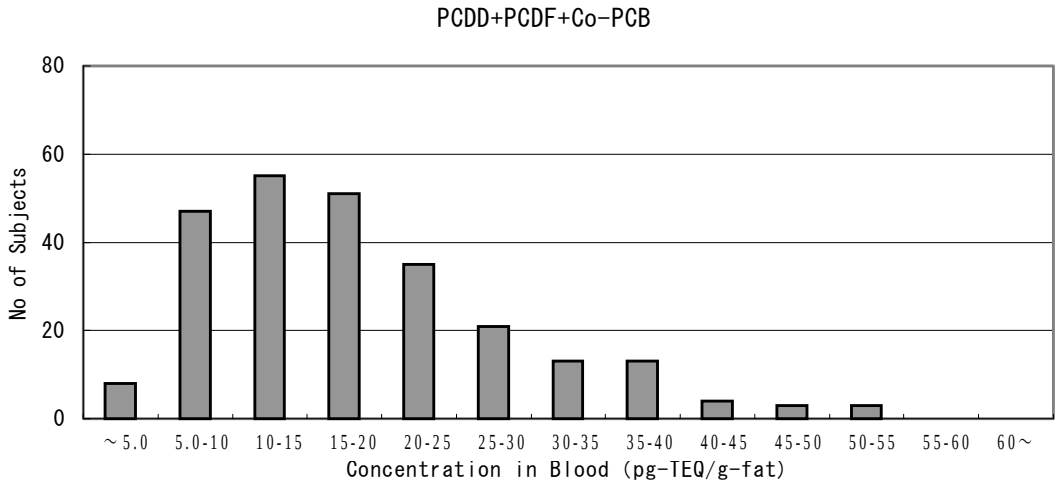
For reference, total TEQ calculated applying 1/2 value of the detection limit as the concentration for the isomers which actual measurements were below the detection limits is shown below.

＜Reference value＞

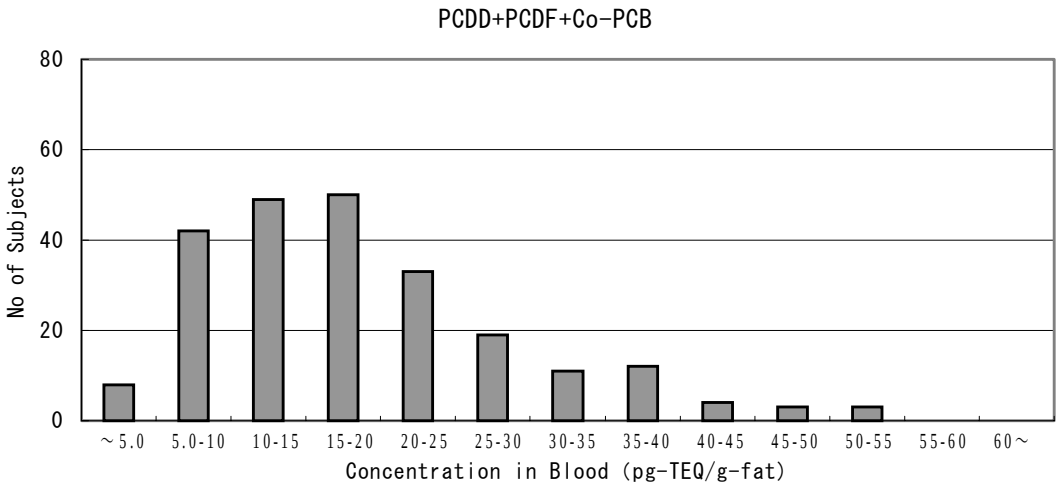
Table 3　Concentrations of PCDDs, PCDFs and Co-PCBs in Blood（pg-TEQ/g fat）

	All Regions	Normal Regions	Waste Incinerator Vicinity Region
n	253	234	19
PCDD+PCDF			
mean	12	12	10
s. d.	5.3	5.4	3.9
median	11	11	9.7
range	2.6 ～ 33	2.6 ～ 33	5.1 ～ 17
Co-PCB			
mean	7.4	7.3	8.2
s. d.	5.3	5.3	6.1
median	5.9	5.8	6.0
range	0.88 ～ 32	0.88 ～ 32	1.6 ～ 22
PCDD+PCDF+Co-PCB			
mean	19	19	18
s. d.	9.9	10	9.2
median	17	18	14
range	3.6 ～ 53	3.6 ～ 53	7.5 ～ 38

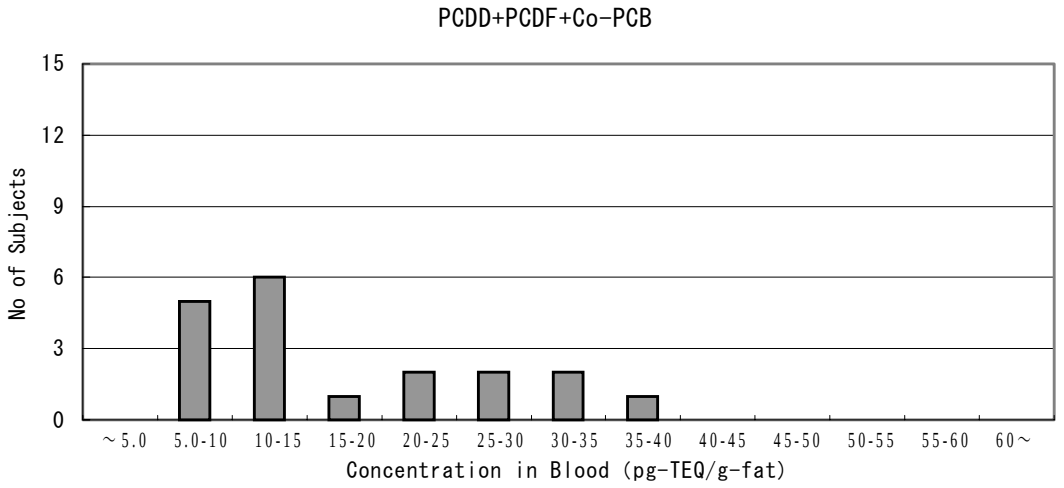
Note: Total TEQ calculated applying 1/2 value of the detection limit as the concentration for the isomers below the lower limit of detection (N. D.) .



Frequency Distribution of Concentration in Blood (all Regions)



Frequency Distribution of Concentration in Blood (Normal Regions)



Frequency Distribution of Concentration in Blood (Waste Incinerator Vicinity Region)

Difference between regions:

The means, standard deviations, and medians of the blood analysis results for each regions are summarized below.

Table 3　Concentrations of PCDDs, PCDFs and Co-PCBs in Blood (pg-TEQ/g fat)

	Normal Regions						Waste Incinerator Vicinity Region
	Region A	Region B	Region C	Region D	Region E	Region F	Region G
n	39	40	44	48	18	45	19
PCDD+PCDF							
mean	10.0	8.9	14	14	8.3	9.7	9.2
s. d.	6.2	3.7	6.5	5.9	3.3	4.1	4.2
median	7.6	8.3	13	13	8.5	8.8	8.8
range	2.9 ～ 32	3.0 ～ 17	0.91 ～ 28	4.8 ～ 33	4.5 ～ 16	3.6 ～ 22	4.0 ～ 17
Co-PCB							
mean	4.9	4.2	8.5	11	8.9	6.7	8.1
s. d.	3.5	3.4	5.0	6.6	5.2	4.6	6.1
median	5.3	3.9	8.6	8.6	7.6	5.6	6.0
range	0.33 ～ 14	0.45 ～ 15	0.40 ～ 20	1.8 ～ 32	2.4 ～ 21	0.88 ～ 23	1.1 ～ 22
PCDD+PCDF+ Co-PCB							
mean	15	13	22	25	17	16	17
s. d.	9.0	6.3	11	12	8.3	8.2	9.6
median	13	12	21	23	17	15	14
range	3.6 ～ 42	3.7 ～ 28	1.3 ～ 46	7.3～53	6.9 ～ 38	6.0 ～ 45	5.9 ～ 38

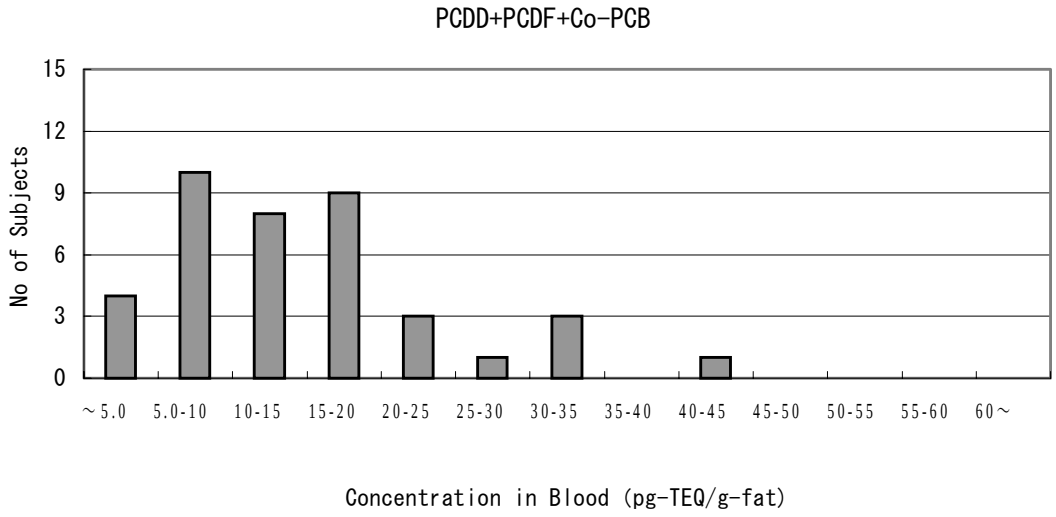
For reference, total TEQ calculated applying 1/2 value of the detection limit as the concentration for the isomers which actual measurements were below the detection limits is shown below.

＜Reference value＞

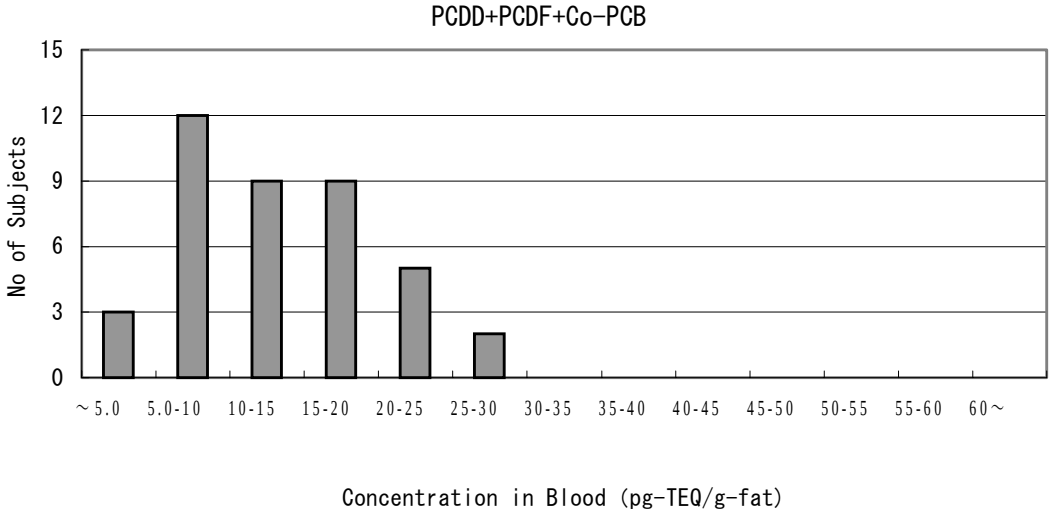
Table 3　Concentrations of PCDDs, PCDFs and Co-PCBs in Blood（pg-TEQ/g fat）

	Normal Regions						Waste Incinerator Vicinity Region
	Region A	Region B	Region C	Region D	Region E	Region F	Region G
n	39	40	44	48	18	45	19
PCDD+PCDF							
mean	11	9.7	14	15	9.2	11	10
s. d.	5.9	3.5	6.2	5.6	3.0	3.9	3.9
median	8.4	9.1	14	14	9.4	9.5	9.7
range	4.0 ～ 32	4.1 ～ 17	2.6 ～ 29	6.0 ～ 33	5.6 ～ 16	4.7 ～ 22	5.1 ～ 17
Co-PCB							
mean	5.1	4.4	8.5	11	8.9	6.7	8.2
s. d.	3.3	3.3	5.0	6.6	5.2	4.5	6.1
median	5.3	3.9	8.6	8.6	7.6	5.6	6.0
range	0.88 ～ 14	1.0 ～ 15	0.95 ～ 20	2.3 ～ 32	2.4 ～ 21	1.4 ～ 23	1.6 ～ 22
PCDD+PCDF+ Co-PCB							
mean	16	14	23	25	18	17	18
s. d.	8.6	6.0	11	11	8.1	8.1	9.2
median	14	13	22	24	18	16	14
range	5.2 ～ 42	5.3 ～ 29	3.6 ～ 46	8.5 ～ 53	8.1 ～ 38	7.1 ～ 45	7.5 ～ 38

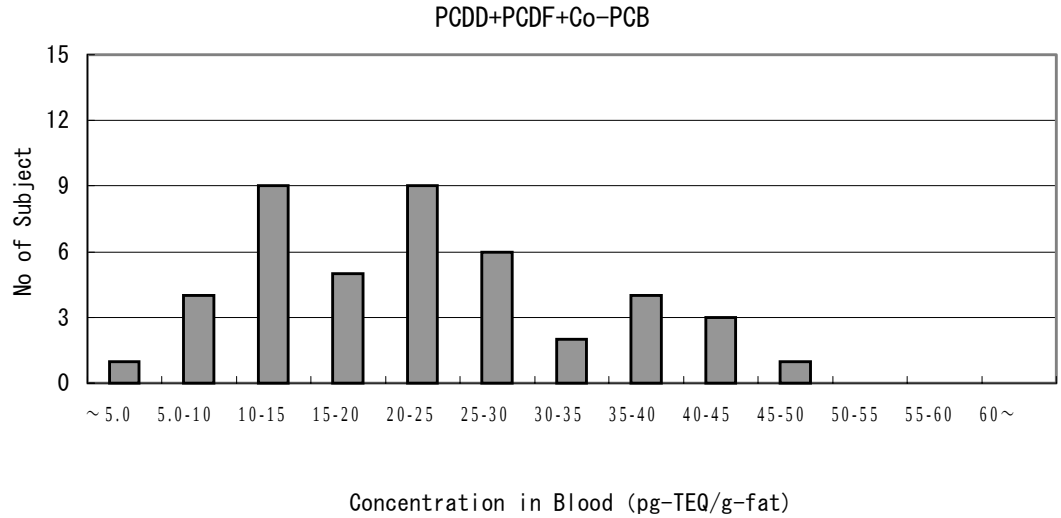
Note: Total TEQ calculated applying 1/2 value of the detection limit as the concentration for the isomers below the lower limit of detection (N. D.) .



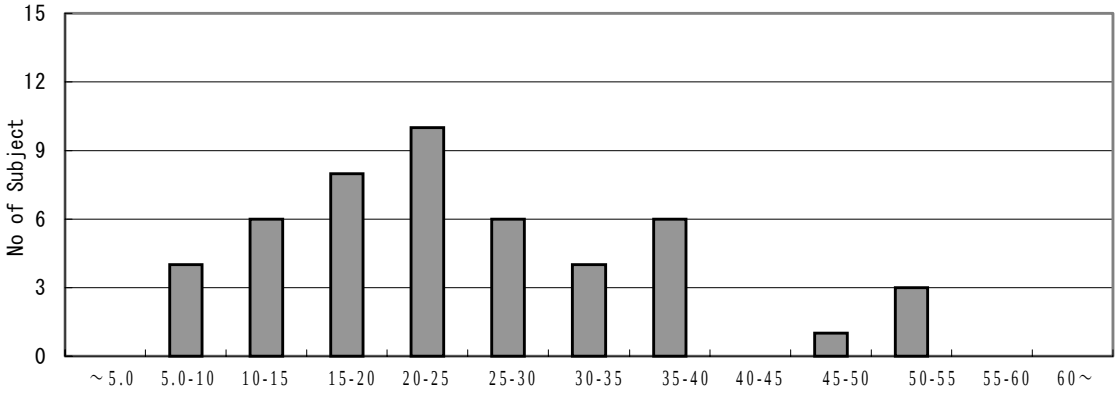
Frequency Distribution of Concentration in Blood (Region A: PCDD＋PCDF＋Co－PCB)



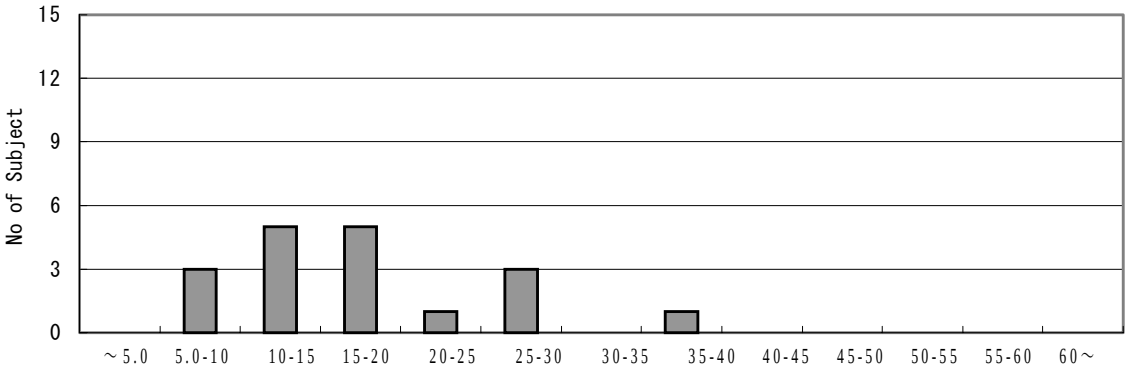
Frequency Distribution of Concentration in Blood (Region B: PCDD＋PCDF＋Co－PCB)



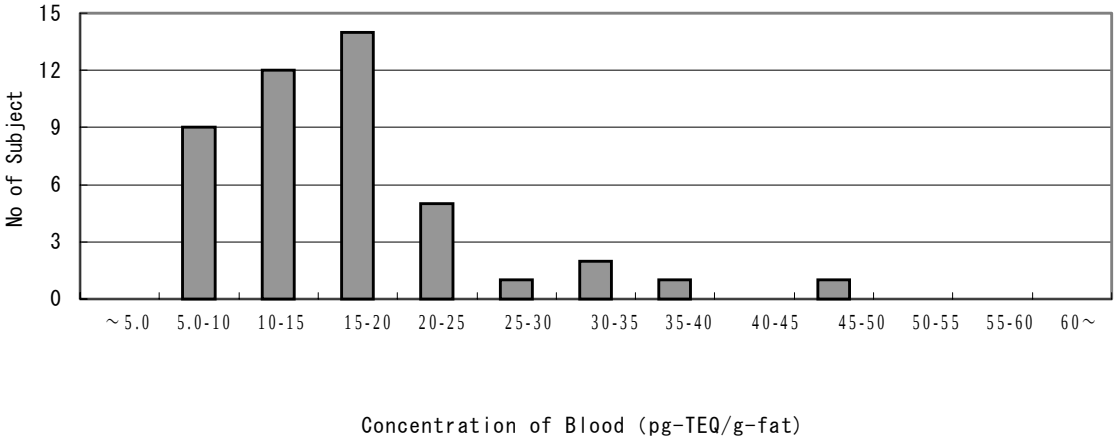
Frequency Distribution of Concentration in Blood (Region B: PCDD＋PCDF＋Co－PCB)



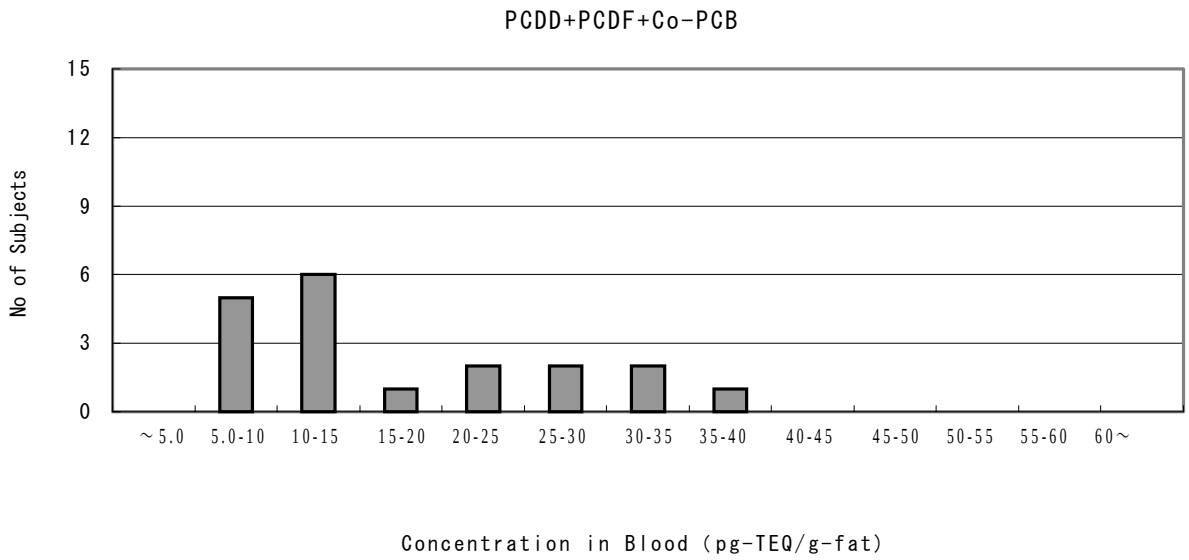
Frequency Distribution of Concentration in Blood (Region D: PCDD＋PCDF＋Co－PCB)



Frequency Distribution of Concentration in Blood (Region D: PCDD＋PCDF＋Co－PCB)



Frequency Distribution of Concentration in Blood (Region F: PCDD＋PCDF＋Co－PCB)



Frequency Distribution of Concentration in Blood (Region G: PCDD+PCDF+Co-PCB)

Sex Difference:

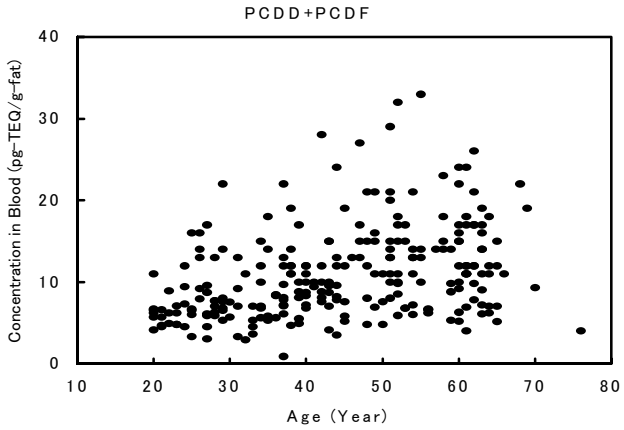
Means for both sexes from all regions are shown below.

No significant difference is seen in the mean values of PCDD+PCDF, Co-PCB, or PCDD+PCDF+Co-PCB for the males and femals tested.

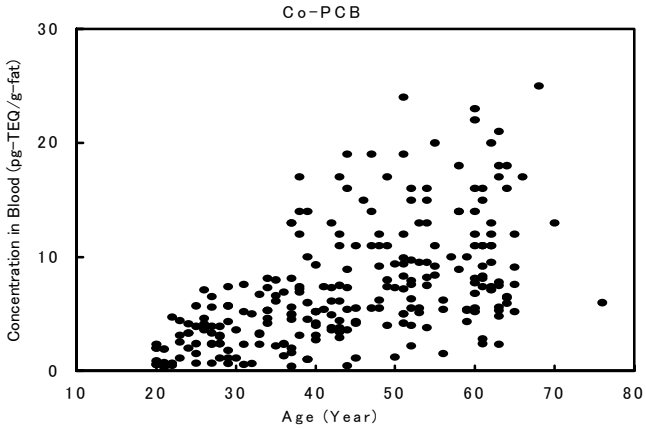
Concentrations of PCDD＋PCDF＋Co－PCB in Blood for both Sexes

	Male	Female
	n=131	n=122
PCDD+PCDF		
mean	11	11
s. d.	6.2	4.8
median	9.8	9.8
range	3.0 ～ 33	0.91 ～ 29
Co-PCB		
mean	7.8	6.9
s. d.	6.0	4.7
median	6.1	5.7
range	0.33 ～ 32	0.40 ～ 24
PCDD+PCDF+Co-PCB		
mean	19	17
s. d.	11	8.9
median	17	16
range	3.7 ～ 53	1.3 ～ 53

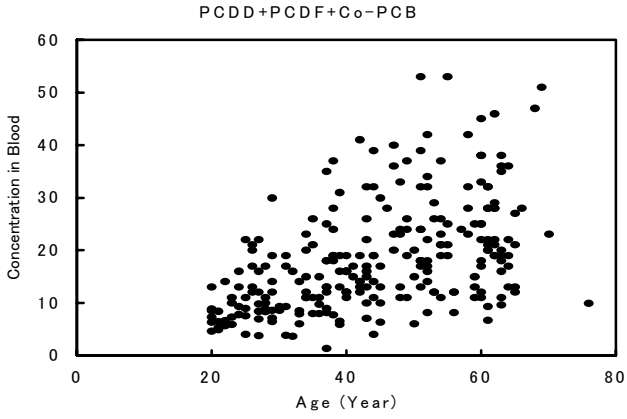
Table 5



Regression equation
y=0.15x-4.3
Coefficient of correlation
0.37
Significance of regression coefficient
1%

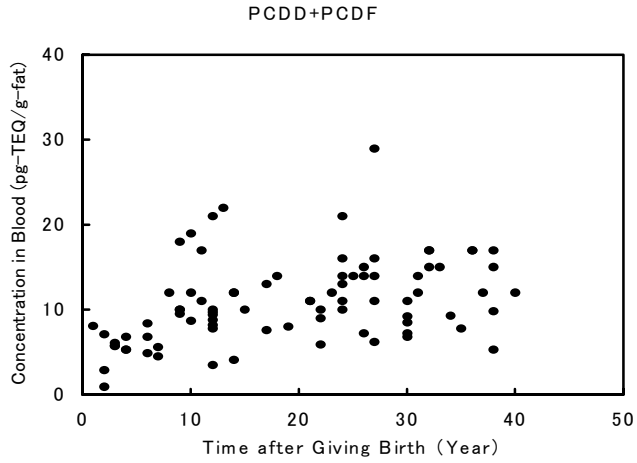


Regression equation
y=0.22x-2.5
Coefficient of correlation
0.56
Significance of regression coefficient
1%

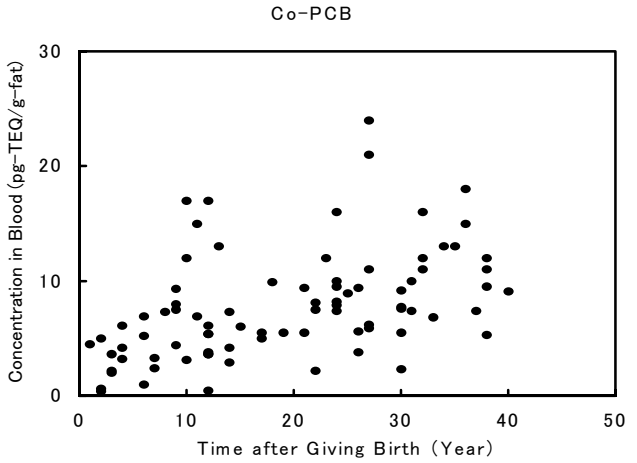


Regression equation
y=0.37x-1.9
Coefficient of correlation
0.50
Significance of regression coefficient
1%

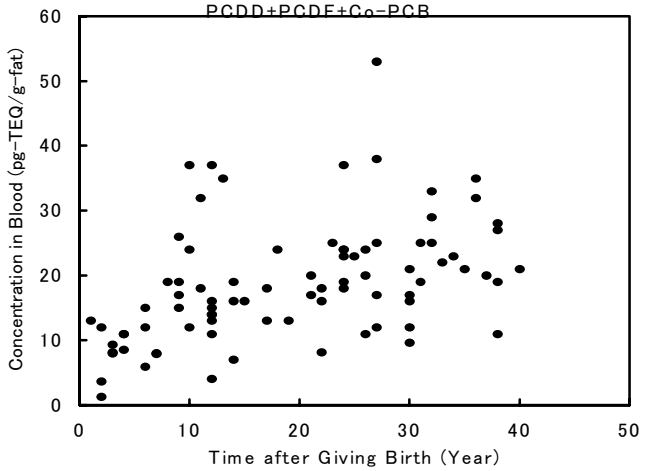
Correlation between the Concentration in Blood and Age



Regression equation
y=0.17x-7.6
Coefficient of correlation
0.39
Significance of regression coefficient
1%



Regression equation
y=0.19x-4.0
Coefficient of correlation
0.47
Significance of regression coefficient
1%



Regression equation
y=0.37x-11.6
Coefficient of correlation
0.45
Significance of regression coefficient
1%

Correlation between the concentration in Blood and Time after Giving Birth

Concentration in Blood in Existing Survey Results (Unit in pg-TEQ/g-fat)

	EA1 Normal Regions	EA1 Waste Incinerator Vicinity Region 1	EA1 Waste Incinerator Vicinity Region 2	MHW 2 Fukuoka Normal Regions	MHW 2 Tokyo Normal Regions	MHW 2 Normal Regions	MHW3 Waste Incinerator Vicinity Region	Abroad 4
Survey Year	1998	1998	1998	1997	1997	1998	1998	1980's and 90's
n	32	15	16	39	13	80	95	
Age								
mean (year)	51	47	51					
range	38 ～ 69	33 ～ 67	40 ～ 60	20 ～ 73	21 ～ 51	30 ～40's	30～40's	
PCDD+PCDF								
mean	19	23	16	19.7	17.9	17.5	16.6	2.1 ～ 60.8
s. d.	11	18	6.2	7.3	20.7	9.4	7.32	
median	18	19	15			15.5	15.6	
range	7.4 ～ 64	2.7 ～ 66	7.7～28					5.2 ～ 114
Co-PCB								
mean	11	14	10	11[5]		6.9[5]	9.5[5]	
s. d.	5.8	12	5.2			4.1	7.2	
median	9.0	11	9.4			5.9	6.8	
range	3.9 ～ 27	2.1 ～ 47	2.9～ 19					
PCDD+PCDF +Co-PCB								
mean	30	37	26	30.9		24.4	26.1	
s. d.	15	28	11	11.4		11.9	11.4	
median	27	28	24			21.7	24.7	
range	11 ～ 78	4.8～ 100	11 ～ 46			4.8 ～ 60.3	9.7 ～ 70.3	

Note 1 EA: *Findings of Fiscal 1998 "Survey on Long-Term Impact of Exposure to Dioxins in the Air"* (Environment Agency of Japan, released August 1999),

Note 2 MHW: *Report on Findings of Fiscal 1997 Health Sciences Research "Survey on Human Exposure to Dioxins "* (Ministry of Health and Welfare, released 1998). ［I-TEF is used for calculation.］

Note 3 MHW: *Report on Findings of Fiscal 1998 Health Sciences Research "Studies on Human Exposure and Health Effects of Dioxins (ad intrim Report on Concentration in Human Blood)"* (Ministry of Health and Welfare, released November 1999).［WHO-TEF （1998） is used.］

Note 4 Extracted from: WHO: *"IARC Monographs On The Evaluation Of Carcinogenic Risks To Humans" VOL69(1997).* ［I-TEF is used for calculation.］

Note 5: Co-PCBs surveyed by Ministry of Health and Welfare are 3,3',4,4'-TeCB, 3,3',4,4',5-PeCB, 3,3',4,4',5,5'-HxCB.

Average Concentration in Blood by Isomers in All Regions （WHO-TEF(1998) is used） (pg-TEQ/g-fat)

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.27	0.53	0	0	2.0	1.47%
	1,2,3,7,8-P5CDD	4.0	2.3	4.0	0	20	21.76%
	1,2,3,4,7,8-H6CDD	0.11	0.15	0	0	0.60	0.61%
	1,2,3,6,7,8-H6CDD	2.1	1.2	1.8	0.30	8.1	11.34%
	1,2,3,7,8,9-H6CDD	0.34	0.26	0.30	0	1.5	1.85%
	1,2,3,4,6,7,8-H7CDD	0.16	0.090	0.14	0.030	0.55	0.87%
	O8CDD	0.034	0.039	0.022	0.0042	0.31	0.19%
	Toatl: PCDDs	7.0	3.9	6.1	0.38	26	38.12%
	2,3,7,8-T4CDF	0.010	0.037	0	0	0.30	0.06%
	1,2,3,7,8-P5CDF	0.0040	0.016	0	0	0.10	0.02%
	2,3,4,7,8-P5CDF	3.1	1.6	3.0	0.50	8.5	17.10%
	1,2,3,4,7,8-H6CDF	0.30	0.17	0.30	0	0.80	1.64%
	1,2,3,6,7,8-H6CDF	0.39	0.20	0.40	0	1.1	2.16%
	1,2,3,7,8,9-H6CDF	0	0	0	0	0	0.00%
	2,3,4,6,7,8-H6CDF	0.12	0.16	0	0	0.80	0.66%
	1,2,3,4,6,7,8-H7CDF	0.039	0.019	0.040	0	0.17	0.21%
	1,2,3,4,7,8,9-H7CDF	0	0	0	0	0	0.00%
	O8CDF	0.000023	0.00037	0	0	0.0059	0.00%
	Total: PCDFs	4.0	2.0	3.6	0.53	11	21.82%
	Total: PCDDs+PCDFs	11	5.6	9.8	0.91	33	59.85%
Co-PCBs	3,3',4,4'-T4CB	0.000043	0.00032	0	0	0.0040	0.00%
	3,4,4',5-T4CB	0	0	0	0	0	0.00%
	3,3',4,4',5-P5CB	3.7	3.1	3.0	0	14	20.16%
	3,3',4,4',5,5'-H6CB	0.31	0.20	0.30	0	1.2	1.68%
	Total: non-ortho PCBs	4.0	3.3	3.3	0	15	21.96%
	2,3,3',4,4'-P5CB	0.14	0.11	0.11	0.012	0.93	0.74%
	2,3,4,4',5-P5CB	0.20	0.16	0.15	0.015	1.30	1.07%
	2,3',4,4',5-P5CB	0.89	0.70	0.74	0.087	5.7	4.86%
	2',3,4,4',5-P5CB	0.029	0.024	0.022	0.0020	0.15	0.16%
	2,3,3',4,4',5-H6CB	1.6	1.1	1.4	0.15	7.0	8.64%
	2,3,3',4,4',5'-H6CB	0.46	0.32	0.39	0.050	2.4	2.52%
	2,3',4,4',5,5'-H6CB	0.017	0.014	0.014	0.0019	0.11	0.09%
	2,3,3',4,4',5,5'-H7CB	0.046	0.034	0.038	0.0060	0.23	0.25%
	Total: mono-ortho PCBs	3.3	2.4	2.8	0.33	18	18.21%
	Total: Co-PCBs	7.3	5.4	5.9	0.33	32	40.09%
Total: PCDDs+PCDFs+Co-PCBs		18	10	17	1.3	53	100.00%

Average Concentration in Blood by Isomers in Normal Regions （WHO-TEF(1998) is used） (pg-TEQ/g-fat)

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.27	0.53	0	0	2.0	1.46%
	1,2,3,7,8-P5CDD	4.0	2.3	4.0	0	20	21.92%
	1,2,3,4,7,8-H6CDD	0.12	0.15	0	0	0.60	0.63%
	1,2,3,6,7,8-H6CDD	2.1	1.2	1.9	0.30	8.1	11.64%
	1,2,3,7,8,9-H6CDD	0.35	0.26	0.30	0	1.5	1.91%
	1,2,3,4,6,7,8-H7CDD	0.16	0.088	0.15	0.030	0.55	0.89%
	O8CDD	0.035	0.039	0.023	0.0049	0.31	0.19%
	Toatl: PCDDs	7.1	4.0	6.2	0.38	26	38.68%
	2,3,7,8-T4CDF	0.010	0.036	0	0	0.30	0.05%
	1,2,3,7,8-P5CDF	0.0036	0.015	0	0	0.10	0.02%
	2,3,4,7,8-P5CDF	3.1	1.6	3.0	0.50	8.5	16.98%
	1,2,3,4,7,8-H6CDF	0.31	0.16	0.30	0	0.80	1.68%
	1,2,3,6,7,8-H6CDF	0.41	0.19	0.40	0	1.1	2.21%
	1,2,3,7,8,9-H6CDF	0	0	0	0	0	0.00%
	2,3,4,6,7,8-H6CDF	0.13	0.17	0	0	0.80	0.69%
	1,2,3,4,6,7,8-H7CDF	0.040	0.018	0.040	0	0.17	0.22%
	1,2,3,4,7,8,9-H7CDF	0	0	0	0	0	0.00%
	O8CDF	0.000025	0.00039	0	0	0.0059	0.00%
	Total: PCDFs	4.0	2.0	3.7	0.53	11	21.80%
	Total: PCDDs+PCDFs	11	5.7	10	0.91	33	60.39%
Co-PCBs	3,3',4,4'-T4CB	0.000038	0.00031	0	0	0.0040	0.00%
	3,4,4',5-T4CB	0	0	0	0	0	0.00%
	3,3',4,4',5-P5CB	3.6	3.0	3.0	0	14	19.85%
	3,3',4,4',5,5'-H6CB	0.30	0.19	0.30	0	1.0	1.64%
	Total: non-ortho PCBs	4.0	3.2	3.3	0	15	21.61%
	2,3,3',4,4'-P5CB	0.14	0.11	0.11	0.012	0.93	0.74%
	2,3,4,4',5-P5CB	0.19	0.16	0.15	0.015	1.3	1.05%
	2,3',4,4',5-P5CB	0.89	0.70	0.75	0.087	5.7	4.83%
	2',3,4,4',5-P5CB	0.029	0.024	0.022	0.0020	0.15	0.16%
	2,3,3',4,4',5-H6CB	1.6	1.1	1.4	0.15	7.0	8.55%
	2,3,3',4,4',5'-H6CB	0.46	0.32	0.39	0.050	2.4	2.49%
	2,3',4,4',5,5'-H6CB	0.017	0.013	0.014	0.0019	0.11	0.09%
	2,3,3',4,4',5,5'-H7CB	0.045	0.033	0.037	0.0060	0.23	0.24%
	Total: mono-ortho PCBs	3.3	2.4	2.8	0.33	18	18.04%
	Total: Co-PCBs	7.3	5.3	5.8	0.33	32	39.56%
Total: PCDDs+PCDFs+Co-PCBs		18	10	17	1.3	53	100.00%

Average Concentration in Blood by Isomers in Waste Incinerator Vicinity Region

（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.26	0.45	0	0	1.0	1.51%
	1,2,3,7,8-P5CDD	3.4	1.5	3.0	2.0	7.0	19.64%
	1,2,3,4,7,8-H6CDD	0.053	0.11	0	0	0.30	0.30%
	1,2,3,6,7,8-H6CDD	1.3	0.68	1.1	0.40	2.9	7.49%
	1,2,3,7,8,9-H6CDD	0.17	0.19	0.20	0	0.60	1.00%
	1,2,3,4,6,7,8-H7CDD	0.12	0.11	0.070	0.050	0.50	0.68%
	O8CDD	0.024	0.036	0.011	0	0.16	0.14%
	Toatl: PCDDs	5.4	2.5	4.8	2.5	9.7	30.85%
	2,3,7,8-T4CDF	0.016	0.050	0	0	0.20	0.09%
	1,2,3,7,8-P5CDF	0.0079	0.019	0	0	0.050	0.05%
	2,3,4,7,8-P5CDF	3.3	1.5	3.0	1.5	6.0	18.73%
	1,2,3,4,7,8-H6CDF	0.22	0.20	0.20	0	0.60	1.24%
	1,2,3,6,7,8-H6CDF	0.26	0.21	0.30	0	0.70	1.51%
	1,2,3,7,8,9-H6CDF	0	0	0	0	0	0.00%
	2,3,4,6,7,8-H6CDF	0.05	0.10	0	0	0.30	0.27%
	1,2,3,4,6,7,8-H7CDF	0.024	0.020	0.030	0	0.060	0.14%
	1,2,3,4,7,8,9-H7CDF	0	0	0	0	0	0.00%
	O8CDF	0	0	0	0	0	0.00%
	Total: PCDFs	3.8	1.9	3.5	1.5	7.4	21.99%
	Total: PCDDs+PCDFs	9.2	4.2	8.8	4.0	17	52.81%
Co-PCBs	3,3',4,4'-T4CB	0.00011	0.00046	0	0	0.0020	0.00%
	3,4,4',5-T4CB	0	0	0	0	0	0.00%
	3,3',4,4',5-P5CB	4.2	3.7	3.0	0	12	24.17%
	3,3',4,4',5,5'-H6CB	0.38	0.25	0.3	0.10	1.2	2.21%
	Total: non-ortho PCBs	4.6	3.9	3.2	0.10	13	26.56%
	2,3,3',4,4'-P5CB	0.14	0.10	0.11	0.033	0.34	0.80%
	2,3,4,4',5-P5CB	0.21	0.16	0.15	0.055	0.65	1.23%
	2,3',4,4',5-P5CB	0.92	0.65	0.72	0.24	2.3	5.26%
	2',3,4,4',5-P5CB	0.032	0.026	0.021	0.0060	0.088	0.18%
	2,3,3',4,4',5-H6CB	1.7	1.2	1.4	0.45	5.5	9.78%
	2,3,3',4,4',5'-H6CB	0.50	0.33	0.44	0.14	1.5	2.88%
	2,3',4,4',5,5'-H6CB	0.019	0.014	0.014	0.0057	0.054	0.11%
	2,3,3',4,4',5,5'-H7CB	0.055	0.039	0.045	0.014	0.18	0.32%
	Total: mono-ortho PCBs	3.6	2.3	2.9	0.98	10	20.39%
	Total: Co-PCBs	8.2	6.1	6.0	1.1	22	46.98%
Total: PCDDs+PCDFs+Co-PCBs		17	9.6	14	5.9	38	100.00%

Average Concentration in Blood by Isomers in Region A （WHO-TEF(1998) is used） (pg-TEQ/g-fat)

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.15	0.43	0	0	2.0	1.03%
	1,2,3,7,8-P5CDD	4.2	3.7	3.0	1.0	20	28.17%
	1,2,3,4,7,8-H6CDD	0.10	0.16	0	0	0.60	0.65%
	1,2,3,6,7,8-H6CDD	1.7	0.8	1.5	0.60	3.8	11.46%
	1,2,3,7,8,9-H6CDD	0.29	0.17	0.30	0	0.70	1.98%
	1,2,3,4,6,7,8-H7CDD	0.12	0.064	0.11	0.030	0.39	0.83%
	O8CDD	0.021	0.016	0.015	0.0060	0.081	0.14%
	Toatl: PCDDs	6.6	4.9	4.9	1.7	26	44.27%
	2,3,7,8-T4CDF	0.0077	0.027	0	0	0.10	0.05%
	1,2,3,7,8-P5CDF	0	0	0	0	0	0.00%
	2,3,4,7,8-P5CDF	2.6	1.2	2.5	1.0	5.5	17.18%
	1,2,3,4,7,8-H6CDF	0.27	0.16	0.30	0	0.60	1.84%
	1,2,3,6,7,8-H6CDF	0.38	0.17	0.40	0	0.70	2.53%
	1,2,3,7,8,9-H6CDF	0	0	0	0	0	0.00%
	2,3,4,6,7,8-H6CDF	0.14	0.16	0	0	0.40	0.93%
	1,2,3,4,6,7,8-H7CDF	0.040	0.014	0.040	0	0.080	0.27%
	1,2,3,4,7,8,9-H7CDF	0	0	0	0	0	0.00%
	O8CDF	0	0	0	0	0	0.00%
	Total: PCDFs	3.4	1.6	3.0	1.0	6.9	22.71%
	Total: PCDDs+PCDFs	10	6.2	7.6	2.9	32	66.91%
Co-PCBs	3,3',4,4'-T4CB	0.00015	0.00071	0	0	0.0040	0.00%
	3,4,4',5-T4CB	0	0	0	0	0	0.00%
	3,3',4,4',5-P5CB	2.5	2.1	2.0	0	8.0	16.66%
	3,3',4,4',5,5'-H6CB	0.24	0.16	0.20	0	0.60	1.60%
	Total: non-ortho PCBs	2.7	2.2	2.5	0	8.6	18.26%
	2,3,3',4,4'-P5CB	0.10	0.071	0.081	0.014	0.30	0.65%
	2,3,4,4',5-P5CB	0.12	0.081	0.11	0.015	0.28	0.82%
	2,3',4,4',5-P5CB	0.62	0.40	0.50	0.091	1.6	4.13%
	2',3,4,4',5-P5CB	0.020	0.015	0.017	0.0030	0.066	0.13%
	2,3,3',4,4',5-H6CB	1.0	0.66	0.90	0.15	2.6	6.86%
	2,3,3',4,4',5'-H6CB	0.30	0.19	0.29	0.050	0.80	2.04%
	2,3',4,4',5,5'-H6CB	0.011	0.0071	0.011	0.0019	0.030	0.08%
	2,3,3',4,4',5,5'-H7CB	0.029	0.019	0.027	0.0060	0.082	0.19%
	Total: mono-ortho PCBs	2.2	1.4	2.2	0.33	5.4	14.82%
	Total: Co-PCBs	4.9	3.5	5.3	0.33	14	33.06%
Total: PCDDs+PCDFs+Co-PCBs		15	9.0	13	3.6	42	100.00%

Average Concentration in Blood by Isomers in Region B （WHO-TEF(1998) is used） (pg-TEQ/g-fat)

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.075	0.27	0	0	1.0	0.57%
	1,2,3,7,8-P5CDD	3.0	1.2	3.0	1.0	5.0	22.94%
	1,2,3,4,7,8-H6CDD	0.11	0.14	0	0	0.40	0.84%
	1,2,3,6,7,8-H6CDD	1.5	0.54	1.5	0.60	3.0	11.68%
	1,2,3,7,8,9-H6CDD	0.26	0.19	0.30	0	0.60	1.95%
	1,2,3,4,6,7,8-H7CDD	0.15	0.072	0.16	0.050	0.37	1.18%
	O8CDD	0.034	0.034	0.021	0.0049	0.16	0.26%
	Toatl: PCDDs	5.2	2.1	4.8	1.7	10	39.39%
	2,3,7,8-T4CDF	0.0025	0.016	0	0	0.10	0.02%
	1,2,3,7,8-P5CDF	0.0013	0.0079	0	0	0.050	0.01%
	2,3,4,7,8-P5CDF	2.7	1.2	2.3	1.0	5.5	20.27%
	1,2,3,4,7,8-H6CDF	0.34	0.18	0.40	0	0.80	2.56%
	1,2,3,6,7,8-H6CDF	0.52	0.22	0.50	0.20	1.0	3.98%
	1,2,3,7,8,9-H6CDF	0	0	0	0	0	0.00%
	2,3,4,6,7,8-H6CDF	0.17	0.20	0.10	0	0.80	1.28%
	1,2,3,4,6,7,8-H7CDF	0.048	0.015	0.050	0.020	0.070	0.37%
	1,2,3,4,7,8,9-H7CDF	0	0	0	0	0	0.00%
	O8CDF	0	0	0	0	0	0.00%
	Total: PCDFs	3.7	1.7	3.4	1.2	8.2	28.53%
	Total: PCDDs+PCDFs	8.9	3.7	8.3	3.0	17	67.84%
Co-PCBs	3,3',4,4'-T4CB	0	0	0	0	0	0.00%
	3,4,4',5-T4CB	0	0	0	0	0	0.00%
	3,3',4,4',5-P5CB	2.0	2.2	2.0	0	9.0	15.49%
	3,3',4,4',5,5'-H6CB	0.19	0.13	0.20	0	0.60	1.43%
	Total: non-ortho PCBs	2.2	2.3	2.2	0	9.6	16.92%
	2,3,3',4,4'-P5CB	0.074	0.063	0.055	0.012	0.27	0.57%
	2,3,4,4',5-P5CB	0.12	0.086	0.088	0.020	0.43	0.91%
	2,3',4,4',5-P5CB	0.46	0.37	0.36	0.087	1.6	3.55%
	2',3,4,4',5-P5CB	0.015	0.013	0.011	0.0020	0.061	0.11%
	2,3,3',4,4',5-H6CB	1.0	0.59	0.83	0.24	2.6	7.69%
	2,3,3',4,4',5'-H6CB	0.28	0.16	0.23	0.065	0.70	2.11%
	2,3',4,4',5,5'-H6CB	0.0093	0.0058	0.0074	0.0026	0.027	0.07%
	2,3,3',4,4',5,5'-H7CB	0.027	0.014	0.025	0.0090	0.061	0.21%
	Total: mono-ortho PCBs	2.0	1.2	1.7	0.45	5.7	15.09%
	Total: Co-PCBs	4.2	3.4	3.9	0.45	15	32.12%
Total: PCDDs+PCDFs+Co-PCBs		13	6.3	12	3.7	28	100.00%

Average Concentration in Blood by Isomers in Region C（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.48	0.68	0	0	2.0	1.95%
	1,2,3,7,8-P5CDD	4.7	2.0	4.0	2.0	10	19.16%
	1,2,3,4,7,8-H6CDD	0.14	0.15	0.20	0	0.60	0.56%
	1,2,3,6,7,8-H6CDD	3.4	1.3	3.2	1.6	8.1	13.76%
	1,2,3,7,8,9-H6CDD	0.57	0.31	0.50	0	1.5	2.32%
	1,2,3,4,6,7,8-H7CDD	0.17	0.095	0.16	0.060	0.55	0.71%
	O8CDD	0.037	0.041	0.026	0.0077	0.21	0.15%
	Toatl: PCDDs	9.5	4.0	8.8	3.8	23	38.48%
	2,3,7,8-T4CDF	0.010	0.031	0	0	0.10	0.04%
	1,2,3,7,8-P5CDF	0.0010	0.0072	0	0	0.050	0.00%
	2,3,4,7,8-P5CDF	3.7	1.8	3.5	1.0	8.5	15.22%
	1,2,3,4,7,8-H6CDF	0.31	0.14	0.30	0	0.70	1.25%
	1,2,3,6,7,8-H6CDF	0.36	0.16	0.40	0	0.80	1.46%
	1,2,3,7,8,9-H6CDF	0	0	0	0	0	0.00%
	2,3,4,6,7,8-H6CDF	0.075	0.13	0	0	0.40	0.31%
	1,2,3,4,6,7,8-H7CDF	0.033	0.018	0.030	0	0.090	0.13%
	1,2,3,4,7,8,9-H7CDF	0	0	0	0	0	0.00%
	O8CDF	0	0	0	0	0	0.00%
	Total: PCDFs	4.5	2.1	4.4	1.0	10	18.36%
	Total: PCDDs+PCDFs	14	5.9	13	4.8	33	56.93%
Co-PCBs	3,3',4,4'-T4CB	0.000042	0.00020	0	0	0.0010	0.00%
	3,4,4',5-T4CB	0	0	0	0	0	0.00%
	3,3',4,4',5-P5CB	5.3	3.6	4.0	0	14	21.36%
	3,3',4,4',5,5'-H6CB	0.36	0.19	0.30	0	0.80	1.45%
	Total: non-ortho PCBs	5.7	3.8	4.3	0.10	15	23.01%
	2,3,3',4,4'-P5CB	0.20	0.16	0.15	0.036	0.93	0.82%
	2,3,4,4',5-P5CB	0.28	0.22	0.25	0.050	1.3	1.13%
	2,3',4,4',5-P5CB	1.4	0.99	1.1	0.24	5.7	5.58%
	2',3,4,4',5-P5CB	0.044	0.032	0.034	0.0080	0.15	0.18%
	2,3,3',4,4',5-H6CB	2.3	1.4	2.3	0.39	7.0	9.26%
	2,3,3',4,4',5'-H6CB	0.68	0.41	0.68	0.14	2.4	2.78%
	2,3',4,4',5,5'-H6CB	0.027	0.019	0.024	0.0050	0.11	0.11%
	2,3,3',4,4',5,5'-H7CB	0.070	0.044	0.064	0.011	0.23	0.29%
	Total: mono-ortho PCBs	4.9	3.2	4.7	1.1	18	20.07%
	Total: Co-PCBs	11	6.6	8.6	1.8	32	42.99%
Total: PCDDs+PCDFs+Co-PCBs		25	12	23	7.3	53	100.00%

Average Concentration in Blood by Isomers in Region D（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.26	0.45	0	0	1.0	1.51%
	1,2,3,7,8-P5CDD	3.4	1.5	3.0	2.0	7.0	19.64%
	1,2,3,4,7,8-H6CDD	0.053	0.11	0	0	0.30	0.30%
	1,2,3,6,7,8-H6CDD	1.3	0.68	1.1	0.40	2.9	7.49%
	1,2,3,7,8,9-H6CDD	0.17	0.19	0.20	0	0.60	1.00%
	1,2,3,4,6,7,8-H7CDD	0.12	0.11	0.070	0.050	0.50	0.68%
	O8CDD	0.024	0.036	0.011	0	0.16	0.14%
	Toatl: PCDDs	5.4	2.5	4.8	2.5	9.7	30.85%
	2,3,7,8-T4CDF	0.016	0.050	0	0	0.20	0.09%
	1,2,3,7,8-P5CDF	0.0079	0.019	0	0	0.050	0.05%
	2,3,4,7,8-P5CDF	3.3	1.5	3.0	1.5	6.0	18.73%
	1,2,3,4,7,8-H6CDF	0.22	0.20	0.20	0	0.60	1.24%
	1,2,3,6,7,8-H6CDF	0.26	0.21	0.30	0	0.70	1.51%
	1,2,3,7,8,9-H6CDF	0	0	0	0	0	0.00%
	2,3,4,6,7,8-H6CDF	0.05	0.10	0	0	0.30	0.27%
	1,2,3,4,6,7,8-H7CDF	0.024	0.020	0.030	0	0.060	0.14%
	1,2,3,4,7,8,9-H7CDF	0	0	0	0	0	0.00%
	O8CDF	0	0	0	0	0	0.00%
	Total: PCDFs	3.8	1.9	3.5	1.5	7.4	21.99%
	Total: PCDDs+PCDFs	9.2	4.2	8.8	4.0	17	52.81%
Co-PCBs	3,3',4,4'-T4CB	0.00011	0.00046	0	0	0.0020	0.00%
	3,4,4',5-T4CB	0	0	0	0	0	0.00%
	3,3',4,4',5-P5CB	4.2	3.7	3.0	0	12	24.17%
	3,3',4,4',5,5'-H6CB	0.38	0.25	0.3	0.10	1.2	2.21%
	Total: non-ortho PCBs	4.6	3.9	3.2	0.10	13	26.56%
	2,3,3',4,4'-P5CB	0.14	0.10	0.11	0.033	0.34	0.80%
	2,3,4,4',5-P5CB	0.21	0.16	0.15	0.055	0.65	1.23%
	2,3',4,4',5-P5CB	0.92	0.65	0.72	0.24	2.3	5.26%
	2',3,4,4',5-P5CB	0.032	0.026	0.021	0.0060	0.088	0.18%
	2,3,3',4,4',5-H6CB	1.7	1.2	1.4	0.45	5.5	9.78%
	2,3,3',4,4',5'-H6CB	0.50	0.33	0.44	0.14	1.5	2.88%
	2,3',4,4',5,5'-H6CB	0.019	0.014	0.014	0.0057	0.054	0.11%
	2,3,3',4,4',5,5'-H7CB	0.055	0.039	0.045	0.014	0.18	0.32%
	Total: mono-ortho PCBs	3.6	2.3	2.9	0.98	10	20.39%
	Total: Co-PCBs	8.2	6.1	6.0	1.1	22	46.98%
Total: PCDDs+PCDFs+Co-PCBs		17	9.6	14	5.9	38	100.00%

Average Concentration in Blood by Isomers in Region E（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.17	0.38	0.0	0.0	1.0	0.96%
	1,2,3,7,8-P5CDD	3.3	1.4	3.0	1.0	6.0	19%
	1,2,3,4,7,8-H6CDD	0.022	0.065	0	0	0.20	0.13%
	1,2,3,6,7,8-H6CDD	1.2	0.54	1.1	0.60	2.5	7.0%
	1,2,3,7,8,9-H6CDD	0.14	0.19	0	0	0.50	0.80%
	1,2,3,4,6,7,8-H7CDD	0.12	0.063	0.11	0.060	0.28	0.71%
	O8CDD	0.024	0.025	0.015	0.0061	0.11	0.14%
	Toatl: PCDDs	5.0	2.1	4.8	2.4	9.7	29%
	2,3,7,8-T4CDF	0.017	0.051	0	0	0.20	0.10%
	1,2,3,7,8-P5CDF	0.0056	0.024	0	0	0.10	0.032%
	2,3,4,7,8-P5CDF	2.9	1.1	2.8	1.5	5.0	16%
	1,2,3,4,7,8-H6CDF	0.21	0.15	0.25	0	0.50	1.2%
	1,2,3,6,7,8-H6CDF	0.25	0.15	0.30	0	0.60	1.4%
	1,2,3,7,8,9-H6CDF	0	0	0	0	0	0.0%
	2,3,4,6,7,8-H6CDF	0	0	0	0	0	0.0%
	1,2,3,4,6,7,8-H7CDF	0.026	0.015	0.030	0.0	0.060	0.15%
	1,2,3,4,7,8,9-H7CDF	0	0	0	0	0	0.0%
	O8CDF	0	0	0	0	0	0.0%
	Total: PCDFs	3.4	1.4	3.3	1.5	6.3	19%
	Total: PCDDs+PCDFs	8.3	3.3	8.5	4.5	16	48%
Co-PCBs	3,3',4,4'-T4CB	0	0	0	0	0	0.0%
	3,4,4',5-T4CB	0	0	0	0	0	0.0%
	3,3',4,4',5-P5CB	4.7	3.3	4.0	1.0	14	27%
	3,3',4,4',5,5'-H6CB	0.41	0.23	0.35	0	0.80	2.4%
	Total: non-ortho PCBs	5.1	3.5	4.3	1.2	15	29%
	2,3,3',4,4'-P5CB	0.16	0.09	0.13	0.04	0.36	0.92%
	2,3,4,4',5-P5CB	0.21	0.13	0.19	0.060	0.46	1.2%
	2,3',4,4',5-P5CB	1.0	0.55	0.86	0.25	2.4	5.8%
	2',3,4,4',5-P5CB	0.034	0.024	0.028	0.012	0.10	0.20%
	2,3,3',4,4',5-H6CB	1.9	1.0	1.7	0.35	3.9	11%
	2,3,3',4,4',5'-H6CB	0.56	0.31	0.49	0.11	1.2	3.2%
	2,3',4,4',5,5'-H6CB	0.021	0.012	0.019	0.0056	0.044	0.12%
	2,3,3',4,4',5,5'-H7CB	0.063	0.039	0.057	0.0080	0.15	0.37%
	Total: mono-ortho PCBs	3.9	2.1	3.5	1.1	7.7	22%
	Total: Co-PCBs	8.9	5.2	7.6	2.4	21.0	51%
Total: PCDDs+PCDFs+Co-PCBs		17	8.3	17	6.9	38	100.00%

Average Concentration in Blood by Isomers in Region F（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.16	0.42	0	0	2.0	0.95%
	1,2,3,7,8-P5CDD	3.6	1.6	3.0	1.0	9.0	22.28%
	1,2,3,4,7,8-H6CDD	0.076	0.12	0	0	0.30	0.46%
	1,2,3,6,7,8-H6CDD	1.8	0.61	1.7	0.80	3.4	10.90%
	1,2,3,7,8,9-H6CDD	0.31	0.19	0.30	0	0.60	1.92%
	1,2,3,4,6,7,8-H7CDD	0.17	0.080	0.16	0.050	0.53	1.06%
	O8CDD	0.035	0.046	0.027	0.0068	0.31	0.22%
	Toatl: PCDDs	6.2	2.7	5.1	1.9	15	37.87%
	2,3,7,8-T4CDF	0.011	0.038	0	0	0.20	0.07%
	1,2,3,7,8-P5CDF	0.012	0.026	0	0	0.10	0.07%
	2,3,4,7,8-P5CDF	2.7	1.2	2.5	1.0	6.0	16.44%
	1,2,3,4,7,8-H6CDF	0.28	0.13	0.30	0	0.50	1.70%
	1,2,3,6,7,8-H6CDF	0.36	0.14	0.40	0	0.60	2.20%
	1,2,3,7,8,9-H6CDF	0.0	0	0.0	0.0	0	0.00%
	2,3,4,6,7,8-H6CDF	0.14	0.17	0	0	0.40	0.88%
	1,2,3,4,6,7,8-H7CDF	0.043	0.022	0.040	0.020	0.17	0.26%
	1,2,3,4,7,8,9-H7CDF	0	0	0	0	0	0.00%
	O8CDF	0	0	0	0	0	0.00%
	Total: PCDFs	3.5	1.6	3.3	1.2	7.7	21.56%
	Total: PCDDs+PCDFs	9.7	4.1	8.8	3.6	22	59.21%
Co-PCBs	3,3',4,4'-T4CB	0.000022	0.00015	0	0	0.0010	0.00%
	3,4,4',5-T4CB	0	0	0	0	0	0.00%
	3,3',4,4',5-P5CB	3.6	2.9	3.0	0	14	22.01%
	3,3',4,4',5,5'-H6CB	0.28	0.15	0.30	0	0.70	1.68%
	Total: non-ortho PCBs	3.9	3.1	3.2	0	15	23.85%
	2,3,3',4,4'-P5CB	0.14	0.098	0.13	0.026	0.51	0.83%
	2,3,4,4',5-P5CB	0.17	0.10	0.14	0.045	0.41	1.02%
	2,3',4,4',5-P5CB	0.83	0.57	0.76	0.16	2.8	5.09%
	2',3,4,4',5-P5CB	0.028	0.023	0.023	0.004	0.1	0.17%
	2,3,3',4,4',5-H6CB	1.3	0.69	1.2	0.33	3.0	7.68%
	2,3,3',4,4',5'-H6CB	0.37	0.20	0.36	0.10	0.90	2.24%
	2,3',4,4',5,5'-H6CB	0.014	0.008	0.014	0.0032	0.041	0.09%
	2,3,3',4,4',5,5'-H7CB	0.032	0.017	0.029	0.0090	0.076	0.20%
	Total: mono-ortho PCBs	2.8	1.6	2.8	0.78	7.9	17.18%
	Total: Co-PCBs	6.7	4.6	5.6	0.88	23	40.93%
Total: PCDDs+PCDFs+Co-PCBs		16	8.2	15	6.0	45	100.00%

Average Concentration in Blood by Isomers in Region G（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.26	0.45	0	0	1.0	1.51%
	1,2,3,7,8-P5CDD	3.4	1.5	3.0	2.0	7.0	19.64%
	1,2,3,4,7,8-H6CDD	0.053	0.11	0	0	0.30	0.30%
	1,2,3,6,7,8-H6CDD	1.3	0.68	1.1	0.40	2.9	7.49%
	1,2,3,7,8,9-H6CDD	0.17	0.19	0.20	0	0.60	1.00%
	1,2,3,4,6,7,8-H7CDD	0.12	0.11	0.070	0.050	0.50	0.68%
	O8CDD	0.024	0.036	0.011	0	0.16	0.14%
	Toatl: PCDDs	5.4	2.5	4.8	2.5	9.7	30.85%
	2,3,7,8-T4CDF	0.016	0.050	0	0	0.20	0.09%
	1,2,3,7,8-P5CDF	0.0079	0.019	0	0	0.050	0.05%
	2,3,4,7,8-P5CDF	3.3	1.5	3.0	1.5	6.0	18.73%
	1,2,3,4,7,8-H6CDF	0.22	0.20	0.20	0	0.60	1.24%
	1,2,3,6,7,8-H6CDF	0.26	0.21	0.30	0	0.70	1.51%
	1,2,3,7,8,9-H6CDF	0	0	0	0	0	0.00%
	2,3,4,6,7,8-H6CDF	0.05	0.10	0	0	0.30	0.27%
	1,2,3,4,6,7,8-H7CDF	0.024	0.020	0.030	0	0.060	0.14%
	1,2,3,4,7,8,9-H7CDF	0	0	0	0	0	0.00%
	O8CDF	0	0	0	0	0	0.00%
	Total: PCDFs	3.8	1.9	3.5	1.5	7.4	21.99%
	Total: PCDDs+PCDFs	9.2	4.2	8.8	4.0	17	52.81%
Co-PCBs	3,3',4,4'-T4CB	0.00011	0.00046	0	0	0.0020	0.00%
	3,4,4',5-T4CB	0	0	0	0	0	0.00%
	3,3',4,4',5-P5CB	4.2	3.7	3.0	0	12	24.17%
	3,3',4,4',5,5'-H6CB	0.38	0.25	0.3	0.10	1.2	2.21%
	Total: non-ortho PCBs	4.6	3.9	3.2	0.10	13	26.56%
	2,3,3',4,4'-P5CB	0.14	0.10	0.11	0.033	0.34	0.80%
	2,3,4,4',5-P5CB	0.21	0.16	0.15	0.055	0.65	1.23%
	2,3',4,4',5-P5CB	0.92	0.65	0.72	0.24	2.3	5.26%
	2',3,4,4',5-P5CB	0.032	0.026	0.021	0.0060	0.088	0.18%
	2,3,3',4,4',5-H6CB	1.7	1.2	1.4	0.45	5.5	9.78%
	2,3,3',4,4',5'-H6CB	0.50	0.33	0.44	0.14	1.5	2.88%
	2,3',4,4',5,5'-H6CB	0.019	0.014	0.014	0.0057	0.054	0.11%
	2,3,3',4,4',5,5'-H7CB	0.055	0.039	0.045	0.014	0.18	0.32%
	Total: mono-ortho PCBs	3.6	2.3	2.9	0.98	10	20.39%
	Total: Co-PCBs	8.2	6.1	6.0	1.1	22	46.98%
Total: PCDDs+PCDFs+Co-PCBs		17	9.6	14	5.9	38	100.00%

Average Concentration in Blood by Isomers in All Regions（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

1/2 value of the detection limit is applied to as the concentration for the isomers below the detection limit.

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.65	0.34	0.50	0.50	2.0	3.42%
	1,2,3,7,8-P5CDD	4.0	2.3	4.0	0.50	20	20.86%
	1,2,3,4,7,8-H6CDD	0.17	0.11	0.10	0.10	0.60	0.90%
	1,2,3,6,7,8-H6CDD	2.1	1.2	1.8	0.30	8.1	10.87%
	1,2,3,7,8,9-H6CDD	0.36	0.23	0.30	0.10	1.5	1.89%
	1,2,3,4,6,7,8-H7CDD	0.16	0.090	0.14	0.030	0.55	0.84%
	O8CDD	0.034	0.039	0.022	0.0042	0.31	0.18%
	Toatl: PCDDs	7.4	3.7	6.6	1.6	26	38.95%
	2,3,7,8-T4CDF	0.056	0.025	0.050	0.050	0.30	0.29%
	1,2,3,7,8-P5CDF	0.027	0.010	0.025	0.025	0.10	0.14%
	2,3,4,7,8-P5CDF	3.1	1.6	3.0	0.50	8.5	16.39%
	1,2,3,4,7,8-H6CDF	0.31	0.15	0.30	0.10	0.80	1.65%
	1,2,3,6,7,8-H6CDF	0.40	0.19	0.40	0.10	1.1	2.10%
	1,2,3,7,8,9-H6CDF	0.10	0	0.10	0.10	0.10	0.52%
	2,3,4,6,7,8-H6CDF	0.18	0.12	0.10	0.10	0.80	0.95%
	1,2,3,4,6,7,8-H7CDF	0.039	0.018	0.040	0.010	0.17	0.21%
	1,2,3,4,7,8,9-H7CDF	0.010	0.00000000064	0.010	0.010	0.010	0.05%
	O8CDF	0.00022	0.00036	0.00020	0.00020	0.0059	0.00%
	Total: PCDFs	4.3	1.9	3.9	1.0	11	22.30%
	Total: PCDDs+PCDFs	12	5.3	11	2.6	33	61.28%
Co-PCBs	3,3',4,4'-T4CB	0.00053	0.00026	0.00050	0.00050	0.0040	0.00%
	3,4,4',5-T4CB	0.00050	0	0.00050	0.00050	0.00050	0.00%
	3,3',4,4',5-P5CB	3.7	3.0	3.0	0.50	14	19.62%
	3,3',4,4',5,5'-H6CB	0.31	0.19	0.30	0.050	1.2	1.63%
	Total: non-ortho PCBs	4.1	3.1	3.3	0.55	15	21.25%
	2,3,3',4,4'-P5CB	0.14	0.11	0.11	0.012	0.93	0.71%
	2,3,4,4',5-P5CB	0.19	0.15	0.15	0.015	1.3	1.01%
	2,3',4,4',5-P5CB	0.89	0.70	0.74	0.087	5.7	4.66%
	2',3,4,4',5-P5CB	0.029	0.024	0.022	0.0020	0.15	0.15%
	2,3,3',4,4',5-H6CB	1.6	1.1	1.4	0.15	7.0	8.19%
	2,3,3',4,4',5'-H6CB	0.46	0.32	0.39	0.050	02	2.40%
	2,3',4,4',5,5'-H6CB	0.017	0.014	0.014	0.0019	0.11	0.09%
	2,3,3',4,4',5,5'-H7CB	0.046	0.034	0.038	0.0060	0.23	0.24%
	Total: mono-ortho PCBs	3.3	2.4	2.8	0.33	18	17.45%
	Total: Co-PCBs	7.4	5.3	5.9	0.88	32	38.74%
Total: PCDDs+PCDFs+Co-PCBs		19	9.9	17	3.6	53	100.00%

Average Concentration in Blood by Isomers in Normal Regions（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

1/2 value of the detection limit is applied to as the concentration for the isomers below the detection limit.

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.66	0.34	0.50	0.50	2.0	3.42%
	1,2,3,7,8-P5CDD	4.0	2.3	4.0	0.50	20	21.01%
	1,2,3,4,7,8-H6CDD	0.18	0.11	0.10	0.10	0.60	0.92%
	1,2,3,6,7,8-H6CDD	2.1	1.2	1.9	0.30	8.1	11.15%
	1,2,3,7,8,9-H6CDD	0.37	0.23	0.30	0.10	1.5	1.94%
	1,2,3,4,6,7,8-H7CDD	0.16	0.088	0.15	0.030	0.55	0.85%
	O8CDD	0.035	0.039	0.023	0.0049	0.31	0.18%
	Toatl: PCDDs	7.6	3.7	6.8	1.6	26	39.47%
	2,3,7,8-T4CDF	0.056	0.024	0.050	0.050	0.30	0.29%
	1,2,3,7,8-P5CDF	0.027	0.010	0.025	0.025	0.10	0.14%
	2,3,4,7,8-P5CDF	3.1	1.6	3.0	0.50	8.5	16.27%
	1,2,3,4,7,8-H6CDF	0.32	0.14	0.30	0.10	0.80	1.67%
	1,2,3,6,7,8-H6CDF	0.41	0.18	0.40	0.10	1.1	2.14%
	1,2,3,7,8,9-H6CDF	0.10	0	0.10	0.10	0.10	0.52%
	2,3,4,6,7,8-H6CDF	0.19	0.12	0.10	0.10	0.80	0.97%
	1,2,3,4,6,7,8-H7CDF	0.041	0.017	0.040	0.010	0.17	0.21%
	1,2,3,4,7,8,9-H7CDF	0.010	0.00000000037	0.010	0.010	0.010	0.05%
	O8CDF	0.00022	0.00037	0.00020	0.00020	0.0059	0.00%
	Total: PCDFs	4.3	1.9	3.9	1.0	11	22.26%
	Total: PCDDs+PCDFs	12	5.4	11	2.6	33	61.74%
Co-PCBs	3,3',4,4'-T4CB	0.00053	0.00025	0.00050	0.00050	0.0040	0.00%
	3,4,4',5-T4CB	0.00050	0	0.00050	0.00050	0.00050	0.00%
	3,3',4,4',5-P5CB	3.7	3.0	3.0	0.50	14	19.32%
	3,3',4,4',5,5'-H6CB	0.30	0.19	0.30	0.050	1.0	1.59%
	Total: non-ortho PCBs	4.0	3.1	3.3	0.55	15	20.91%
	2,3,3',4,4'-P5CB	0.14	0.11	0.11	0.012	0.93	0.71%
	2,3,4,4',5-P5CB	0.19	0.15	0.15	0.015	1.3	1.00%
	2,3',4,4',5-P5CB	0.89	0.70	0.75	0.087	5.7	4.63%
	2',3,4,4',5-P5CB	0.029	0.024	0.022	0.0020	0.15	0.15%
	2,3,3',4,4',5-H6CB	1.6	1.1	1.4	0.15	7.0	8.11%
	2,3,3',4,4',5'-H6CB	0.46	0.32	0.39	0.050	2.4	2.37%
	2,3',4,4',5,5'-H6CB	0.017	0.013	0.014	0.0019	0.11	0.09%
	2,3,3',4,4',5,5'-H7CB	0.045	0.033	0.037	0.0060	0.23	0.23%
	Total: mono-ortho PCBs	3.3	2.4	2.8	0.33	18	17.29%
	Total: Co-PCBs	7.3	5.3	5.8	0.88	32	38.24%
Total: PCDDs+PCDFs+Co-PCBs		0.66	0.34	0.50	0.50	2.0	3.42%

Average Concentration in Blood by Isomers in Waste Incinerator Vicinity Region

（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

1/2 value of the detection limit is applied to as the concentration for the isomers below the detection limit.

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.63	0.23	0.50	0.50	1.0	3.47%
	1,2,3,7,8-P5CDD	3.4	1.5	3.0	2.0	7.0	18.82%
	1,2,3,4,7,8-H6CDD	0.13	0.067	0.10	0.10	0.30	0.72%
	1,2,3,6,7,8-H6CDD	1.3	0.68	1.1	0.40	2.9	7.18%
	1,2,3,7,8,9-H6CDD	0.22	0.15	0.20	0.10	0.60	1.22%
	1,2,3,4,6,7,8-H7CDD	0.12	0.11	0.070	0.050	0.50	0.65%
	O8CDD	0.024	0.036	0.011	0.0042	0.16	0.13%
	Toatl: PCDDs	5.9	2.3	5.4	3.2	9.8	32.20%
	2,3,7,8-T4CDF	0.061	0.036	0.050	0.050	0.20	0.33%
	1,2,3,7,8-P5CDF	0.029	0.0094	0.025	0.025	0.050	0.16%
	2,3,4,7,8-P5CDF	3.3	1.5	3.0	1.5	6.0	17.95%
	1,2,3,4,7,8-H6CDF	0.25	0.16	0.20	0.10	0.60	1.39%
	1,2,3,6,7,8-H6CDF	0.29	0.18	0.30	0.10	0.70	1.59%
	1,2,3,7,8,9-H6CDF	0.10	0	0.10	0.10	0.10	0.55%
	2,3,4,6,7,8-H6CDF	0.13	0.056	0.10	0.10	0.30	0.69%
	1,2,3,4,6,7,8-H7CDF	0.027	0.016	0.030	0.010	0.060	0.15%
	1,2,3,4,7,8,9-H7CDF	0.010	0	0.010	0.010	0.010	0.06%
	O8CDF	0.00020	0	0.00020	0.00020	0.00020	0.00%
	Total: PCDFs	4.2	1.8	3.9	2.0	7.6	22.87%
	Total: PCDDs+PCDFs	10	3.9	9.7	5.1	17	55.36%
Co-PCBs	3,3',4,4'-T4CB	0.00058	0.00034	0.00050	0.00050	0.0020	0.00%
	3,4,4',5-T4CB	0.00050	0	0.00050	0.00050	0.00050	0.00%
	3,3',4,4',5-P5CB	4.3	3.6	3.0	0.50	12	23.45%
	3,3',4,4',5,5'-H6CB	0.38	0.25	0.30	0.10	1.2	2.11%
	Total: non-ortho PCBs	4.6	3.8	3.2	0.60	13	25.57%
	2,3,3',4,4'-P5CB	0.14	0.10	0.11	0.033	0.34	0.77%
	2,3,4,4',5-P5CB	0.21	0.16	0.15	0.055	0.65	1.17%
	2,3',4,4',5-P5CB	0.92	0.65	0.72	0.24	2.3	5.04%
	2',3,4,4',5-P5CB	0.032	0.026	0.021	0.0060	0.088	0.17%
	2,3,3',4,4',5-H6CB	1.7	1.2	1.4	0.45	5.5	9.27%
	2,3,3',4,4',5'-H6CB	0.50	0.33	0.44	0.14	1.5	2.75%
	2,3',4,4',5,5'-H6CB	0.019	0.014	0.014	0.0057	0.054	0.10%
	2,3,3',4,4',5,5'-H7CB	0.055	0.039	0.045	0.014	0.18	0.30%
	Total: mono-ortho PCBs	3.6	2.4	2.9	0.98	10	19.58%
	Total: Co-PCBs	8.2	6.1	6.0	1.6	22	45.31%
Total: PCDDs+PCDFs+Co-PCBs		18	9.2	14	7.5	38	100.00%

Average Concentration in Blood by Isomers in Region A（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

1/2 value of the detection limit is applied to as the concentration for the isomers below the detection limit.

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.59	0.28	0.50	0.50	2.0	3.73%
	1,2,3,7,8-P5CDD	4.2	3.7	3.0	1.0	20	26.57%
	1,2,3,4,7,8-H6CDD	0.17	0.12	0.10	0.10	0.60	1.05%
	1,2,3,6,7,8-H6CDD	1.7	0.75	1.5	0.60	3.8	10.81%
	1,2,3,7,8,9-H6CDD	0.31	0.14	0.30	0.10	0.70	1.96%
	1,2,3,4,6,7,8-H7CDD	0.12	0.064	0.11	0.030	0.39	0.78%
	O8CDD	0.021	0.016	0.015	0.0060	0.081	0.14%
	Toatl: PCDDs	7.1	4.7	5.5	2.4	26	45.04%
	2,3,7,8-T4CDF	0.054	0.013	0.050	0.050	0.10	0.34%
	1,2,3,7,8-P5CDF	0.025	0	0.025	0.025	0.025	0.16%
	2,3,4,7,8-P5CDF	2.6	1.2	2.5	1.0	5.5	16.20%
	1,2,3,4,7,8-H6CDF	0.29	0.13	0.30	0.10	0.60	1.83%
	1,2,3,6,7,8-H6CDF	0.38	0.15	0.40	0.10	0.70	2.43%
	1,2,3,7,8,9-H6CDF	0.10	0	0.10	0.10	0.10	0.63%
	2,3,4,6,7,8-H6CDF	0.19	0.11	0.10	0.10	0.40	1.22%
	1,2,3,4,6,7,8-H7CDF	0.040	0.014	0.040	0.010	0.080	0.25%
	1,2,3,4,7,8,9-H7CDF	0.010	0	0.010	0.010	0.010	0.06%
	O8CDF	0.00020	0.0000000000091	0.00020	0.00020	0.00020	0.00%
	Total: PCDFs	3.7	1.5	3.3	1.5	7.0	23.13%
	Total: PCDDs+PCDFs	11	5.9	8.4	4.0	32	68.10%
Co-PCBs	3,3',4,4'-T4CB	0.00063	0.00060	0.00050	0.00050	0.0040	0.00%
	3,4,4',5-T4CB	0.00050	0	0.00050	0.00050	0.00050	0.00%
	3,3',4,4',5-P5CB	2.6	1.9	2.0	0.50	8.0	16.45%
	3,3',4,4',5,5'-H6CB	0.24	0.16	0.20	0.050	0.60	1.55%
	Total: non-ortho PCBs	2.8	2.1	2.5	0.55	8.6	18.00%
	2,3,3',4,4'-P5CB	0.10	0.071	0.081	0.014	0.30	0.61%
	2,3,4,4',5-P5CB	0.12	0.080	0.11	0.015	0.28	0.76%
	2,3',4,4',5-P5CB	0.62	0.40	0.50	0.091	1.6	3.90%
	2',3,4,4',5-P5CB	0.020	0.015	0.017	0.0030	0.066	0.13%
	2,3,3',4,4',5-H6CB	1.0	0.65	0.90	0.15	2.6	6.41%
	2,3,3',4,4',5'-H6CB	0.30	0.19	0.29	0.050	0.80	1.91%
	2,3',4,4',5,5'-H6CB	0.011	0.0071	0.011	0.0019	0.030	0.07%
	2,3,3',4,4',5,5'-H7CB	0.029	0.019	0.027	0.0060	0.082	0.18%
	Total: mono-ortho PCBs	2.2	1.4	2.2	0.33	5.4	13.98%
	Total: Co-PCBs	5.1	3.3	5.3	0.88	14	31.96%
Total: PCDDs+PCDFs+Co-PCBs		16	8.6	14	5.2	42	100.00%

Average Concentration in Blood by Isomers in Region B（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

1/2 value of the detection limit is applied to as the concentration for the isomers below the detection limit.

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.54	0.13	0.50	0.50	1.0	3.84%
	1,2,3,7,8-P5CDD	3.0	1.2	3.0	1.0	5.0	21.46%
	1,2,3,4,7,8-H6CDD	0.17	0.10	0.10	0.10	0.40	1.22%
	1,2,3,6,7,8-H6CDD	1.5	0.54	1.5	0.60	3.0	10.92%
	1,2,3,7,8,9-H6CDD	0.29	0.15	0.30	0.10	0.60	2.04%
	1,2,3,4,6,7,8-H7CDD	0.15	0.072	0.16	0.050	0.37	1.11%
	O8CDD	0.034	0.034	0.021	0.0049	0.16	0.24%
	Toatl: PCDDs	5.7	2.0	5.4	2.4	10	40.83%
	2,3,7,8-T4CDF	0.051	0.0079	0.050	0.050	0.10	0.37%
	1,2,3,7,8-P5CDF	0.026	0.0040	0.025	0.025	0.050	0.18%
	2,3,4,7,8-P5CDF	2.7	1.2	2.3	1.0	5.5	18.95%
	1,2,3,4,7,8-H6CDF	0.35	0.16	0.40	0.10	0.80	2.49%
	1,2,3,6,7,8-H6CDF	0.52	0.22	0.50	0.20	1.0	3.72%
	1,2,3,7,8,9-H6CDF	0.10	0	0.10	0.10	0.10	0.72%
	2,3,4,6,7,8-H6CDF	0.22	0.16	0.15	0.10	0.80	1.56%
	1,2,3,4,6,7,8-H7CDF	0.048	0.015	0.050	0.020	0.070	0.34%
	1,2,3,4,7,8,9-H7CDF	0.010	0	0.010	0.010	0.010	0.07%
	O8CDF	0.00020	0.0000000000090	0.00020	0.00020	0.00020	0.00%
	Total: PCDFs	4.0	1.6	3.6	1.6	8.3	28.39%
	Total: PCDDs+PCDFs	9.7	3.5	9.1	4.1	17	69.46%
Co-PCBs	3,3',4,4'-T4CB	0.00050	0	0.00050	0.00050	0.00050	0.00%
	3,4,4',5-T4CB	0.00050	0	0.00050	0.00050	0.00050	0.00%
	3,3',4,4',5-P5CB	2.2	2.0	2.0	0.50	9.0	15.47%
	3,3',4,4',5,5'-H6CB	0.20	0.12	0.20	0.050	0.60	1.40%
	Total: non-ortho PCBs	2.4	2.1	2.2	0.55	9.6	16.88%
	2,3,3',4,4'-P5CB	0.074	0.063	0.055	0.012	0.27	0.53%
	2,3,4,4',5-P5CB	0.12	0.085	0.088	0.020	0.43	0.84%
	2,3',4,4',5-P5CB	0.46	0.37	0.36	0.087	1.6	3.32%
	2',3,4,4',5-P5CB	0.015	0.013	0.011	0.0020	0.061	0.11%
	2,3,3',4,4',5-H6CB	0.99	0.58	0.83	0.24	2.6	7.11%
	2,3,3',4,4',5'-H6CB	0.27	0.16	0.23	0.065	0.70	1.96%
	2,3',4,4',5,5'-H6CB	0.0093	0.0058	0.0074	0.0026	0.027	0.07%
	2,3,3',4,4',5,5'-H7CB	0.027	0.014	0.025	0.0090	0.061	0.20%
	Total: mono-ortho PCBs	2.0	1.2	1.7	0.45	5.7	14.12%
	Total: Co-PCBs	4.4	3.3	3.9	1.0	15	31.11%
Total: PCDDs+PCDFs+Co-PCBs		14	6.0	13	5.3	29	100.00%

Average Concentration in Blood by Isomers in Region C（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

1/2 value of the detection limit is applied to as the concentration for the isomers below the detection limit.

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.77	0.41	0.50	0.50	2.0	3.40%
	1,2,3,7,8-P5CDD	4.8	2.3	5.0	0.5	9.0	21.03%
	1,2,3,4,7,8-H6CDD	0.23	0.14	0.20	0.10	0.60	1.03%
	1,2,3,6,7,8-H6CDD	2.5	1.1	2.5	0.30	6.6	10.84%
	1,2,3,7,8,9-H6CDD	0.40	0.21	0.40	0.10	1.0	1.74%
	1,2,3,4,6,7,8-H7CDD	0.20	0.11	0.18	0.060	0.47	0.88%
	O8CDD	0.049	0.046	0.029	0.0065	0.21	0.22%
	Toatl: PCDDs	8.9	3.9	8.9	1.6	18.8	39.14%
	2,3,7,8-T4CDF	0.059	0.039	0.050	0.050	0.30	0.26%
	1,2,3,7,8-P5CDF	0.026	0.0053	0.025	0.025	0.050	0.11%
	2,3,4,7,8-P5CDF	3.9	1.9	3.5	0.50	8.5	17.24%
	1,2,3,4,7,8-H6CDF	0.39	0.18	0.35	0.10	0.80	1.72%
	1,2,3,6,7,8-H6CDF	0.49	0.22	0.40	0.10	1.1	2.16%
	1,2,3,7,8,9-H6CDF	0.10	0.0000000025	0.10	0.10	0.10	0.44%
	2,3,4,6,7,8-H6CDF	0.22	0.14	0.20	0.10	0.60	0.95%
	1,2,3,4,6,7,8-H7CDF	0.044	0.017	0.040	0.020	0.10	0.19%
	1,2,3,4,7,8,9-H7CDF	0.010	0	0.010	0.010	0.010	0.04%
	O8CDF	0.00033	0.00086	0.00020	0.00020	0.0059	0.00%
	Total: PCDFs	5.3	2.4	5.0	1.0	11	23.12%
	Total: PCDDs+PCDFs	14	6.2	14	2.6	29	62.17%
Co-PCBs	3,3',4,4'-T4CB	0.00050	0	0.00050	0.00050	0.00050	0.00%
	3,4,4',5-T4CB	0.00050	0	0.00050	0.00050	0.00050	0.00%
	3,3',4,4',5-P5CB	4.1	2.7	4.0	0.50	11	17.94%
	3,3',4,4',5,5'-H6CB	0.38	0.20	0.40	0.050	1.0	1.68%
	Total: non-ortho PCBs	4.5	2.8	4.3	0.55	12	19.62%
	2,3,3',4,4'-P5CB	0.15	0.089	0.14	0.019	0.34	0.64%
	2,3,4,4',5-P5CB	0.25	0.16	0.26	0.015	0.60	1.11%
	2,3',4,4',5-P5CB	1.0	0.61	0.97	0.11	2.7	4.38%
	2',3,4,4',5-P5CB	0.030	0.020	0.027	0.0040	0.075	0.13%
	2,3,3',4,4',5-H6CB	2.0	1.2	1.9	0.19	4.9	8.75%
	2,3,3',4,4',5'-H6CB	0.57	0.34	0.55	0.055	1.6	2.49%
	2,3',4,4',5,5'-H6CB	0.020	0.013	0.016	0.0019	0.063	0.09%
	2,3,3',4,4',5,5'-H7CB	0.053	0.030	0.047	0.0080	0.14	0.23%
	Total: mono-ortho PCBs	4.1	2.4	4.1	0.40	10	17.81%
	Total: Co-PCBs	8.5	4.9	8.6	0.95	20	37.43%
Total: PCDDs+PCDFs+Co-PCBs		23	11	22	3.6	46	100.00%

Average Concentration in Blood by Isomers in Region D（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

1/2 value of the detection limit is applied to as the concentration for the isomers below the detection limit.

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.79	0.47	0.50	0.50	2.0	3.15%
	1,2,3,7,8-P5CDD	4.7	2.0	4.0	2.0	10	18.71%
	1,2,3,4,7,8-H6CDD	0.19	0.10	0.20	0.10	0.60	0.74%
	1,2,3,6,7,8-H6CDD	3.4	1.3	3.2	1.6	8.10	13.43%
	1,2,3,7,8,9-H6CDD	0.58	0.30	0.50	0.10	1.5	2.28%
	1,2,3,4,6,7,8-H7CDD	0.17	0.10	0.16	0.060	0.55	0.69%
	O8CDD	0.037	0.041	0.026	0.0077	0.21	0.15%
	Toatl: PCDDs	9.9	3.8	9.2	4.5	23	39.14%
	2,3,7,8-T4CDF	0.055	0.015	0.050	0.050	0.10	0.22%
	1,2,3,7,8-P5CDF	0.026	0.004	0.025	0.025	0.050	0.10%
	2,3,4,7,8-P5CDF	3.7	1.8	3.5	1.0	8.5	14.86%
	1,2,3,4,7,8-H6CDF	0.31	0.12	0.30	0.10	0.70	1.25%
	1,2,3,6,7,8-H6CDF	0.36	0.14	0.40	0.10	0.80	1.45%
	1,2,3,7,8,9-H6CDF	0.10	0.0000000036	0.10	0.10	0.10	0.40%
	2,3,4,6,7,8-H6CDF	0.15	0.08	0.10	0.10	0.40	0.58%
	1,2,3,4,6,7,8-H7CDF	0.034	0.016	0.030	0.010	0.090	0.13%
	1,2,3,4,7,8,9-H7CDF	0.010	0	0.010	0.010	0.010	0.04%
	O8CDF	0.00020	0.0000000000052	0.00020	0.00020	0.00020	0.00%
	Total: PCDFs	4.8	2.0	4.6	1.5	10	19.03%
	Total: PCDDs+PCDFs	15	5.6	14	6.0	33	58.17%
Co-PCBs	3,3',4,4'-T4CB	0.00052	0.00010	0.00050	0.00050	0.0010	0.00%
	3,4,4',5-T4CB	0.00050	0	0.00050	0.00050	0.00050	0.00%
	3,3',4,4',5-P5CB	5.3	3.6	4.0	0.5	14	20.90%
	3,3',4,4',5,5'-H6CB	0.36	0.19	0.30	0.05	0.80	1.42%
	Total: non-ortho PCBs	5.62	3.73	4.30	0.60	15	22.32%
	2,3,3',4,4'-P5CB	0.20	0.16	0.15	0.036	0.93	0.80%
	2,3,4,4',5-P5CB	0.28	0.21	0.25	0.050	1.3	1.09%
	2,3',4,4',5-P5CB	1.4	0.99	1.10	0.24	5.7	5.45%
	2',3,4,4',5-P5CB	0.044	0.032	0.034	0.008	0.15	0.17%
	2,3,3',4,4',5-H6CB	2.3	1.4	2.3	0.39	7.0	8.96%
	2,3,3',4,4',5'-H6CB	0.68	0.41	0.68	0.14	2.4	2.69%
	2,3',4,4',5,5'-H6CB	0.027	0.019	0.024	0.0050	0.11	0.11%
	2,3,3',4,4',5,5'-H7CB	0.070	0.044	0.064	0.011	0.23	0.28%
	Total: mono-ortho PCBs	4.9	3.1	4.7	1.1	18	19.55%
	Total: Co-PCBs	11	6.6	8.6	2.3	32	42.04%
Total: PCDDs+PCDFs+Co-PCBs		25	11	24	8.5	53	100.00%

Average Concentration in Blood by Isomers in Region E（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

1/2 value of the detection limit is applied to as the concentration for the isomers below the detection limit.

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.58	0.19	0.50	0.50	1.0	3.2%
	1,2,3,7,8-P5CDD	3.3	1.4	3.0	1.0	6.0	18%
	1,2,3,4,7,8-H6CDD	0.11	0.032	0.10	0.10	0.20	0.61%
	1,2,3,6,7,8-H6CDD	1.2	0.54	1.1	0.60	2.5	6.7%
	1,2,3,7,8,9-H6CDD	0.20	0.15	0.10	0.10	0.50	1.1%
	1,2,3,4,6,7,8-H7CDD	0.12	0.063	0.11	0.060	0.28	0.68%
	O8CDD	0.024	0.025	0.015	0.0061	0.11	0.13%
	Toatl: PCDDs	5.5	1.9	5.4	3.0	9.7	30%
	2,3,7,8-T4CDF	0.061	0.037	0.050	0.050	0.20	0.33%
	1,2,3,7,8-P5CDF	0.029	0.018	0.025	0.025	0.10	0.16%
	2,3,4,7,8-P5CDF	2.9	1.1	2.8	1.5	5.0	16%
	1,2,3,4,7,8-H6CDF	0.24	0.11	0.25	0.10	0.50	1.31%
	1,2,3,6,7,8-H6CDF	0.27	0.13	0.30	0.10	0.60	1.46%
	1,2,3,7,8,9-H6CDF	0.10	0.0000000013	0.10	0.10	0.10	0.55%
	2,3,4,6,7,8-H6CDF	0.10	0.0000000013	0.10	0.10	0.10	0.55%
	1,2,3,4,6,7,8-H7CDF	0.028	0.012	0.030	0.010	0.060	0.15%
	1,2,3,4,7,8,9-H7CDF	0.010	0.00000000011	0.010	0.010	0.010	0.055%
	O8CDF	0.00020	0	0.00020	0.00020	0.00020	0.0%
	Total: PCDFs	3.7	1.3	3.6	2.0	6.5	20%
	Total: PCDDs+PCDFs	9.2	3.0	9.4	5.6	16	50.21%
Co-PCBs	3,3',4,4'-T4CB	0.00050	0	0.00050	0.00050	0.00050	0.00%
	3,4,4',5-T4CB	0.00050	0	0.00050	0.00050	0.00050	0.00%
	3,3',4,4',5-P5CB	4.7	3.3	4.0	1.0	14	25.55%
	3,3',4,4',5,5'-H6CB	0.41	0.23	0.35	0.05	0.80	2.27%
	Total: non-ortho PCBs	5.1	3.4	4.3	1.2	15	27.82%
	2,3,3',4,4'-P5CB	0.16	0.089	0.13	0.043	0.36	0.87%
	2,3,4,4',5-P5CB	0.21	0.12	0.19	0.060	0.46	1.16%
	2,3',4,4',5-P5CB	1.0	0.55	0.86	0.25	2.4	5.51%
	2',3,4,4',5-P5CB	0.034	0.024	0.028	0.012	0.10	0.19%
	2,3,3',4,4',5-H6CB	1.8	1.0	1.7	0.35	3.9	10.04%
	2,3,3',4,4',5'-H6CB	0.55	0.30	0.48	0.11	1.2	3.00%
	2,3',4,4',5,5'-H6CB	0.021	0.012	0.019	0.0056	0.044	0.12%
	2,3,3',4,4',5,5'-H7CB	0.063	0.039	0.057	0.0080	0.15	0.35%
	Total: mono-ortho PCBs	3.9	2.1	3.5	1.1	7.7	21.23%
	Total: Co-PCBs	8.9	5.2	7.6	2.4	21.0	48.72%
Total: PCDDs+PCDFs+Co-PCBs		18	8.1	18	8.1	38	100.00%

Average Concentration in Blood by Isomers in Region F（WHO-TEF(1998) is used） (pg-TEQ/g-fat)

1/2 value of the detection limit is applied to as the concentration for the isomers below the detection limit.

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.59	0.27	0.50	0.50	2.0	3.42%
	1,2,3,7,8-P5CDD	3.6	1.6	3.0	1.0	9.0	21.14%
	1,2,3,4,7,8-H6CDD	0.15	0.079	0.10	0.10	0.30	0.85%
	1,2,3,6,7,8-H6CDD	1.8	0.61	1.7	0.80	3.4	10.34%
	1,2,3,7,8,9-H6CDD	0.33	0.16	0.30	0.10	0.60	1.92%
	1,2,3,4,6,7,8-H7CDD	0.17	0.080	0.16	0.050	0.53	1.00%
	O8CDD	0.035	0.046	0.027	0.0068	0.31	0.21%
	Toatl: PCDDs	6.7	2.5	5.7	2.6	15	38.87%
	2,3,7,8-T4CDF	0.057	0.025	0.050	0.050	0.20	0.33%
	1,2,3,7,8-P5CDF	0.032	0.017	0.025	0.025	0.10	0.19%
	2,3,4,7,8-P5CDF	2.7	1.2	2.5	1.0	6.0	15.60%
	1,2,3,4,7,8-H6CDF	0.29	0.10	0.30	0.10	0.50	1.68%
	1,2,3,6,7,8-H6CDF	0.36	0.12	0.40	0.10	0.60	2.11%
	1,2,3,7,8,9-H6CDF	0.10	0.00	0.10	0.10	0.10	0.58%
	2,3,4,6,7,8-H6CDF	0.20	0.12	0.10	0.10	0.40	1.15%
	1,2,3,4,6,7,8-H7CDF	0.043	0.022	0.040	0.020	0.17	0.25%
	1,2,3,4,7,8,9-H7CDF	0.010	0	0.010	0.010	0.010	0.06%
	O8CDF	0.00020	0	0.00020	0.00020	0.00020	0.00%
	Total: PCDFs	3.8	1.5	3.5	1.6	7.8	21.94%
	Total: PCDDs+PCDFs	11	3.9	9.5	4.7	22	61.00%
Co-PCBs	3,3',4,4'-T4CB	0.00051	0.000075	0.00050	0.00050	0.0010	0.00%
	3,4,4',5-T4CB	0.00050	0.0	0.00050	0.00050	0.00050	0.00%
	3,3',4,4',5-P5CB	3.6	2.8	3.0	0.50	14	21.08%
	3,3',4,4',5,5'-H6CB	0.28	0.15	0.30	0.050	0.70	1.61%
	Total: non-ortho PCBs	3.9	3.0	3.2	0.55	15	22.69%
	2,3,3',4,4'-P5CB	0.14	0.098	0.13	0.026	0.51	0.79%
	2,3,4,4',5-P5CB	0.16	0.10	0.14	0.045	0.41	0.96%
	2,3',4,4',5-P5CB	0.83	0.57	0.76	0.16	2.8	4.83%
	2',3,4,4',5-P5CB	0.028	0.023	0.023	0.0040	0.12	0.16%
	2,3,3',4,4',5-H6CB	1.2	0.68	1.2	0.33	3.0	7.20%
	2,3,3',4,4',5'-H6CB	0.36	0.20	0.36	0.10	0.90	2.11%
	2,3',4,4',5,5'-H6CB	0.014	0.0085	0.014	0.0032	0.041	0.08%
	2,3,3',4,4',5,5'-H7CB	0.032	0.017	0.029	0.0090	0.076	0.19%
	Total: mono-ortho PCBs	2.8	1.6	2.8	0.78	7.9	16.31%
	Total: Co-PCBs	6.7	4.5	5.6	1.4	23	39.06%
Total: PCDDs+PCDFs+Co-PCBs		17	8.1	16	7.1	45	100.00%

Average Concentration in Blood by Isomers Region G (WHO-TEF(1998) is used） (pg-TEQ/g-fat)

1/2 value of the detection limit is applied to as the concentration for the isomers below the detection limit.

	Isomers	mean	s. d.	median	minimum	maximum	%
PCDDs+PCDFs	2,3,7,8-T4CDD	0.63	0.23	0.50	0.50	1.0	3.47%
	1,2,3,7,8-P5CDD	3.4	1.5	3.0	2.0	7.0	18.82%
	1,2,3,4,7,8-H6CDD	0.13	0.067	0.10	0.10	0.30	0.72%
	1,2,3,6,7,8-H6CDD	1.3	0.68	1.1	0.40	2.9	7.18%
	1,2,3,7,8,9-H6CDD	0.22	0.15	0.20	0.10	0.60	1.22%
	1,2,3,4,6,7,8-H7CDD	0.12	0.11	0.070	0.050	0.50	0.65%
	O8CDD	0.024	0.036	0.011	0.0042	0.16	0.13%
	Toatl: PCDDs	5.9	2.3	5.4	3.2	9.8	32.20%
	2,3,7,8-T4CDF	0.061	0.036	0.050	0.050	0.20	0.33%
	1,2,3,7,8-P5CDF	0.029	0.0094	0.025	0.025	0.050	0.16%
	2,3,4,7,8-P5CDF	3.3	1.5	3.0	1.5	6.0	17.95%
	1,2,3,4,7,8-H6CDF	0.25	0.16	0.20	0.10	0.60	1.39%
	1,2,3,6,7,8-H6CDF	0.29	0.18	0.30	0.10	0.70	1.59%
	1,2,3,7,8,9-H6CDF	0.10	0	0.10	0.10	0.10	0.55%
	2,3,4,6,7,8-H6CDF	0.13	0.056	0.10	0.10	0.30	0.69%
	1,2,3,4,6,7,8-H7CDF	0.027	0.016	0.030	0.010	0.060	0.15%
	1,2,3,4,7,8,9-H7CDF	0.010	0	0.010	0.010	0.010	0.06%
	O8CDF	0.00020	0	0.00020	0.00020	0.00020	0.00%
	Total: PCDFs	4.2	1.8	3.9	2.0	7.6	22.87%
	Total: PCDDs+PCDFs	10	3.9	9.7	5.1	17	55.36%
Co-PCBs	3,3',4,4'-T4CB	0.00058	0.00034	0.00050	0.00050	0.0020	0.00%
	3,4,4',5-T4CB	0.00050	0	0.00050	0.00050	0.00050	0.00%
	3,3',4,4',5-P5CB	4.3	3.6	3.0	0.50	12	23.45%
	3,3',4,4',5,5'-H6CB	0.38	0.25	0.30	0.10	1.2	2.11%
	Total: non-ortho PCBs	4.6	3.8	3.2	0.60	13	25.57%
	2,3,3',4,4'-P5CB	0.14	0.10	0.11	0.033	0.34	0.77%
	2,3,4,4',5-P5CB	0.21	0.16	0.15	0.055	0.65	1.17%
	2,3',4,4',5-P5CB	0.92	0.65	0.72	0.24	2.3	5.04%
	2',3,4,4',5-P5CB	0.032	0.026	0.021	0.0060	0.088	0.17%
	2,3,3',4,4',5-H6CB	1.7	1.2	1.4	0.45	5.5	9.27%
	2,3,3',4,4',5'-H6CB	0.50	0.33	0.44	0.14	1.5	2.75%
	2,3',4,4',5,5'-H6CB	0.019	0.014	0.014	0.0057	0.054	0.10%
	2,3,3',4,4',5,5'-H7CB	0.055	0.039	0.045	0.014	0.18	0.30%
	Total: mono-ortho PCBs	3.6	2.4	2.9	0.98	10	19.58%
	Total: Co-PCBs	8.2	6.1	6.0	1.6	22	45.31%
Total: PCDDs+PCDFs+Co-PCBs		18	9.2	14	7.5	38	100.00%

III. Findings of the Survey of the State of Dioxin Accumulation in Wildlife

Summary

The accumulation of dioxins in wildlife (fish, amphibians, birds, marine mammals, and land mammals) was studied as one indicator of environmental pollution. The results show that predators higher in the food chain in the ecosystem tend to have greater accumulations of dioxins than predators lower in the food chain. Terrestrial organisms had relatively high accumulations of PCDDs and PCDFs, while marine organisms tended to have higher accumulations of co-planar PCBs.

1. Background

The problem of dioxins is not only an urgent issue of environmental conservation in relation to human health; it also raises concerns about the impact on wildlife.

Reports on incidents of accidental environmental pollution with chemicals show that the effects may be observed in wildlife and livestock before they are seen in human beings. In addition, it will be possible to ascertain the impact of future measures to reduce dioxins by means of the exposure experienced by living organisms. All this suggests that wildlife offer the potential to serve as a valuable indicator of environmental pollution.

Given these circumstances, the Environment Agency established a Research Team to Survey the State of Pollution by Dioxins in Wildlife in fiscal 1998, and conducted surveys of the state of dioxin accumulation in wildlife (fish, amphibians, birds, marine mammals, and land mammals) as an indicator of environmental pollution. The team's report was recently completed, and its findings will be presented here.

In its first fiscal year, the present survey analyzed the state of dioxin accumulation in numerous species, partly for the purpose of selecting indicator organisms to serve as subjects for long-term monitoring. The survey thus included fish (carp), amphibians (frogs), birds (domestic pigeons, kites, raptors), marine mammals (cetaceans, seals), and land mammals (Japanese wood mice, Japanese macaques, bears, raccoon dogs, sika deer).

2. Summary of Research

(1) Fish (Carp)

○ Habitat

Carp inhabit the midstream, downstream, and estuaries of rivers, ponds, lakes, and marshes, where they have a liking for the lower regions of deep pools where the current is slow, for muddy sand bottoms, and for places in and among rocks, concrete blocks, randomly placed stakes, and so on in downstream areas.

○ Feeding Habits

Carp are omnivores that feed mainly on benthic organisms. In their larval stage, carp ingest plankton and sessile organisms found on water plants growing in still water. In the fry stage, they feed mostly on the larvae of midges. The adult fish feed on shellfish such as pond snails and corbiculae, midge larvae, tubifex, lugworms, sessile diatoms, etc.

(a) Number of Specimens

48 specimens

(b) Method of Collection

Net capture

(c) Test Samples

Muscle tissue

(d) Items Measured

Dioxins: Concentration and toxicity (TEQ)

(e) Calculation Method

Wet weight (fat weight figures appended for reference)

The toxic equivalency factors (TEFs) used were from WHO TEF, 1998.

Isomers that were detected at levels below the lower limit of determination were assigned a zero value.

Concentrations below the lower limit of determination were converted to TEQ values equivalent to the lower limit of determination or half of that lower limit, and those TEQ values are shown in a separate table for reference.

(f) Analysis Method

Refer to the manual.

(g) Findings

See appended materials.

Evaluation of the toxicity (fish TEF, figures in brackets calculated by mammal TEF) of dioxins showed: The mean value was 1.3 (3.0) pg-TEQ/g wet weight, and the median value was 1.1 (2.8) pg-TEQ/g wet weight. The range detected was 0.20 (0.56)–5.9 (11) pg-TEQ/g wet weight.

Co-planar PCBs accounted for 6.0% (57%) of the total TEQ value when compared in terms of overall mean values, and 5.7% (52%) when the median values were compared.

(2) Amphibians (Frogs)

○ Habitat

The brown frogs that were the subject of this survey largely inhabit marshes, ponds, and surrounding areas, overgrown areas around paddy fields, fallow paddy fields, and bogs. However, they are also found in fairly dry grassy locations and sunlit forest floors. They live primarily on land.

○ Feeding Habits

The larvae are omnivorous but the adults are carnivorous, feeding on spiders, flies, beetles, butterfly larvae, worms, slugs, etc.

(a) Number of Specimens

80 specimens

(b) Method of Collection

Net traps or net capture

(c) Test Samples

Whole body

(d) Items Measured

Dioxins: Concentration and toxicity

(e) Calculation Method

Wet weight (fat weight figures appended for reference)

The toxic equivalency factors (TEFs) used were from WHO TEF, 1998.

Isomers that were detected at levels below the lower limit of determination were assigned a zero value.

Concentrations below the lower limit of determination were converted to TEQ values equivalent to the lower limit of determination or half of that lower limit, and those TEQ values are shown in a separate table for reference.

(f) Analysis Method

Refer to the manual.

(g) Findings

See appended materials.

Evaluation of the toxicity (fish TEF, figures in brackets calculated by mammal TEF) of dioxins showed:

The mean value was 2.7 (4.1) pg-TEQ/g wet weight, and the median value was 2.6 (4.0) pg-TEQ/g wet

weight.

The range detected was 0.20 (0.50)–7.5 (11) pg-TEQ/g wet weight.

Co-planar PCBs accounted for 2.5% (34%) of the total TEQ value when compared in terms of overall mean values, and 2.5% (33%) when the median values were compared.

(3) Birds (Domestic Pigeons)

○ Habitat

These birds are presently observed throughout Japan in urban areas, rural areas, offshore islands, and so on. Recently, in particular, their distribution has shown a conspicuous expansion from city centers toward suburbs.

○ Feeding Habits

Domestic pigeons are herbivorous and feed mainly on the ground, but an important part of their diet is thought to be provided by human beings in the form of mixed birdseed, bread, raw and cooked rice, confectioneries, etc. They are also known to eat berries from trees and small land snails.

(a) Number of Specimens

15 specimens

(b) Method of Collection

Individual specimens from nuisance wildlife extermination activity

(c) Test Samples

Muscle tissue, liver (some samples included fat tissue and kidneys)

(d) Items Measured

Dioxins: Concentration and toxicity

(e) Calculation Method

Wet weight (fat weight figures appended for reference)

The toxic equivalency factors (TEFs) used were from WHO TEF, 1998.

Isomers that were detected at levels below the lower limit of determination were assigned a zero value.

Concentrations below the lower limit of determination were converted to TEQ values equivalent to the lower limit of determination or half of that lower limit, and those TEQ values are shown in a separate table for reference.

(f) Analysis Method

Refer to the manual.

(g) Findings

See appended materials.

Evaluation of the toxicity (avian TEF, figures in brackets calculated by mammal TEF) of dioxins showed:

-Muscle tissue and liver: 5 specimens

The mean value was 0.98 (0.79) pg-TEQ/g wet weight, and the median value was 0.99 (0.67) pg-TEQ/g wet weight.

The range detected was 0.55 (0.40)–1.3 (1.3) pg-TEQ/g wet weight.

-Muscle tissue, liver, and kidney: 2 specimens

The mean value was 4.7 (4.7) pg-TEQ/g wet weight, and the median value was 4.7 (4.7) pg-TEQ/g wet weight.

The range detected was 4.5 (4.4)–4.9 (5.0) pg-TEQ/g wet weight.

-Muscle tissue, liver, kidney, and fat tissue: 8 specimens

The mean value was 4.1 (4.2) pg-TEQ/g wet weight, and the median value was 2.5 (2.6) pg-TEQ/g wet weight.

The range detected was 0.99 (1.1)–10 (10) pg-TEQ/g wet weight.

Co-planar PCBs accounted for 29% (29%) of the total TEQ value when compared in terms of overall mean values, and 10% (14%) when the median values were compared.

(4) Birds (Kites)

○ Habitat

Kites are seen from plains up into mountainous areas throughout Japan. Although their primary habitat is in the regions extending outward from cities into farmland, they also live near bodies of water in mountainous areas. They prefer to be near rivers, lakes, and bogs, or locations near open water in harbors and so on. They ordinarily live near where they feed, with an activity range of about 1–3 km, but may travel approximately 10 km when in passage or when dispersed.

○ Feeding Habits

Kites are carnivorous, feeding on small to medium-sized mammals, birds, reptiles, amphibians, fish, insects, arachnids, worms, etc.

(a) Number of Specimens

28 specimens

(b) Method of Collection

Individual specimens that were killed accidents or died after being rescued

(c) Test Samples

Muscle tissue, fat tissue

(d) Items Measured

Dioxins: Concentration and toxicity

(e) Calculation Method

Wet weight (fat weight figures appended for reference)

The toxic equivalency factors (TEFs) used were from WHO TEF, 1998.

Isomers that were detected at levels below the lower limit of determination were assigned a zero value.

Concentrations below the lower limit of determination were converted to TEQ values equivalent to the lower limit of determination or half of that lower limit, and those TEQ values are shown in a separate table for reference.

(f) Analysis Method

Refer to the manual.

(g) Findings

See appended materials.

Evaluation of the toxicity (avian TEF, figures in brackets calculated by mammal TEF) of dioxins showed:

-Muscle tissue: 8 specimens

The mean value was 89 (100) pg-TEQ/g wet weight, and the median value was 40 (42) pg-TEQ/g wet weight.

The range detected was 9.4 (11)–390 (470) pg-TEQ/g wet weight.

-Muscle tissue, fat tissue: 20 specimens

The mean value was 99 (86) pg-TEQ/g wet weight, and the median value was 92 (78) pg-TEQ/g wet weight.

The range detected was 22 (13)–220 (220) pg-TEQ/g wet weight.

Co-planar PCBs accounted for 69% (64%) of the total TEQ value when compared in terms of overall mean values, and 67% (66%) when the median values were compared.

(5) Birds (Raptors)

○ Habitat

Blakiston's fish-owl: A resident bird that inhabits forests along rivers and lakes in portions of Hokkaido. Other raptors: Of the species used for this survey, the brown hawk-owl is a summer bird while the others are resident birds that are distributed throughout Japan from Kyushu to the north and inhabit forests from plains to mountainous regions. Their feeding areas include forests, farmland, flood plains along rivers, golf courses, etc.

○ Feeding Habits

Raptors are carnivorous, feeding on small mammals, birds, reptiles, amphibians, fish, insects, etc. The Blakiston's fish-owl feeds mainly on fish, while the brown hawk-owl, a small bird, feeds mainly on insects. Other species included in this survey eat mainly mammals and birds.

(a) Number of Specimens

9 specimens

(b) Method of Collection

Recovered carcasses

(c) Test Samples

Muscle and fat tissue, liver

(d) Items Measured

Dioxins: Concentration and toxicity

(e) Calculation Method

Wet weight (fat weight figures appended for reference)

The toxic equivalency factors (TEFs) used were from WHO TEF, 1998.

Isomers that were detected at levels below the lower limit of determination were assigned a zero value.

Concentrations below the lower limit of determination were converted to TEQ values equivalent to the lower limit of determination or half of that lower limit, and those TEQ values are shown in a separate table for reference.

(f) Analysis Method

Refer to the manual.

(g) Findings

See appended materials.

Evaluation of the toxicity (avian TEF, figures in brackets calculated by mammal TEF) of dioxins showed:

-Muscle and fat tissue: 4 specimens

The mean value was 79 (49) pg-TEQ/g wet weight, and the median value was 76 (45) pg-TEQ/g wet weight.

The range detected was 66 (37)–96 (70) pg-TEQ/g wet weight.

-Liver: 5 specimens

The mean value was 160 (120) pg-TEQ/g wet weight, and the median value was 74 (63) pg-TEQ/g wet weight.

The range detected was 14 (10)–530 (380) pg-TEQ/g wet weight.

Co-planar PCBs accounted for 32% (37%) of the total TEQ value when compared in terms of overall mean values, and 45% (63%) when the median values were compared.

(6) Marine Mammals (Cetaceans)

○ Habitat

Most of the species in this study were pelagic, but the porpoise and finless black porpoise are coastal species.

○ Feeding Habits

Cetaceans are carnivorous, and the baleen whale feeds on small schooling fish, krill and other plankton, while the beaked whale feeds mainly on cephalopods (cuttlefish, etc.) and fish. The finless black porpoise, which belongs to the beaked whale category, feeds on small schooling fish and shallow-water bottom-dwelling invertebrates.

(a) Number of Specimens

22 specimens

(b) Method of Collection

Stranded carcasses, etc.

(c) Test Samples

Fat tissue

(d) Items Measured

Dioxins: Concentration and toxicity

(e) Calculation Method

Wet weight (fat weight figures appended for reference)

The toxic equivalency factors (TEFs) used were from WHO TEF, 1998 (mammals).

Isomers that were detected at levels below the lower limit of determination were assigned a zero value.

Concentrations below the lower limit of determination were converted to TEQ values equivalent to the lower limit of determination or half of that lower limit, and those TEQ values are shown in a separate table for reference.

(f) Analysis Method

Refer to the manual.

(g) Findings

See appended materials.

Evaluation of the toxicity of dioxins showed:

The mean value was 88 pg-TEQ/g wet weight, and the median value was 81 pg-TEQ/g wet weight.

The range detected was 1.3–200 pg-TEQ/g wet weight.

Co-planar PCBs accounted for 94% of the total TEQ value when compared in terms of overall mean values, and 93% when the median values were compared.

(7) Marine Mammals (Seals)

○ Habitat

In seas adjacent to Japan, seals are distributed along the Pacific, Sea of Okhotsk, and Japan Sea coasts of Hokkaido.

○ Feeding Habits

Seals are carnivorous and prefer the coastal giant Pacific octopus but also feed on fish (sculpin, fluke, gunnel, etc.).

(a) Number of Specimens

13 specimens

(b) Method of Collection

Carcasses from incidental catch, stranded carcasses, etc.

(c) Test Samples

Fat tissue

(d) Items Measured

Dioxins: Concentration and toxicity

(e) Calculation Method

Wet weight (fat weight figures appended for reference)

The toxic equivalency factors (TEFs) used were from WHO TEF, 1998 (mammals).

Isomers that were detected at levels below the lower limit of determination were assigned a zero value.

Concentrations below the lower limit of determination were converted to TEQ values equivalent to the lower limit of determination or half of that lower limit, and those TEQ values are shown in a separate table for reference.

(f) Analysis Method

Refer to the manual.

(g) Findings

See appended materials.

Evaluation of the toxicity of dioxins showed:

The mean value was 17 pg-TEQ/g wet weight, and the median value was 17 pg-TEQ/g wet weight.

The range detected was 8.6–27 pg-TEQ/g wet weight.

Co-planar PCBs accounted for 84% of the total TEQ value when compared in terms of overall mean values, and 82% when the median values were compared.

(8) Land Mammals (Japanese Wood Mice)

○ Habitat

The Japanese wood mouse is distributed in shrine and temple groves, wooded areas bordering farmland, river flood plains, and so on from lowland to alpine regions. It has an activity range several hectares.

○ Feeding Habits

It is an omnivorous animal that feeds on plant roots and stems, seeds, nuts and berries, insects, etc.

(a) Number of Specimens

37 specimens

(b) Method of Collection

Caught in traps

(c) Test Samples

Whole body

(d) Items Measured

Dioxins: Concentration and toxicity

(e) Calculation Method

Wet weight (fat weight figures appended for reference)

The toxic equivalency factors (TEFs) used were from WHO TEF, 1998 (mammals).

Isomers that were detected at levels below the lower limit of determination were assigned a zero value.

Concentrations below the lower limit of determination were converted to TEQ values equivalent to the lower limit of determination or half of that lower limit, and those TEQ values are shown in a separate table for reference.

(f) Analysis Method

Refer to the manual.

(g) Findings

See appended materials.

Evaluation of the toxicity of dioxins showed:

The mean value was 39 pg-TEQ/g wet weight, and the median value was 35 pg-TEQ/g wet weight.

The range detected was 0.52–120 pg-TEQ/g wet weight.

Co-planar PCBs accounted for 29% of the total TEQ value when compared in terms of overall mean values, and 21% when the median values were compared.

(9) Land Mammals (Japanese Macaques)

○ Habitat

Japanese macaques are distributed in the forests from Aomori Prefecture in the north to Kagoshima Prefecture in the south, but sometimes are also seen on agricultural land. The activity range (area of free movement) of macaque troops is an area of about 2–25 km^2.

○ Feeding Habits

The Japanese macaque is omnivorous and feeds on fruit, seeds, leaves, and shoots in trees and on the ground, insects, and small animals, but plants form the bulk of its diet. It will sometimes also eat farm produce.

(a) Number of Specimens

30 specimens

(b) Method of Collection

Individual specimens from nuisance wildlife extermination activity and others captured for scientific purposes

(c) Test Samples

Fat tissue, liver, muscle tissue

(d) Items Measured

Dioxins: Concentration and toxicity

(e) Calculation Method

Wet weight (fat weight figures appended for reference)

The toxic equivalency factors (TEFs) used were from WHO TEF, 1998 (mammals).

Isomers that were detected at levels below the lower limit of determination were assigned a zero value.

Concentrations below the lower limit of determination were converted to TEQ values equivalent to the lower limit of determination or half of that lower limit, and those TEQ values are shown in a separate table for reference.

(f) Analysis Method

Refer to the manual.

(g) Findings

See appended materials.

Evaluation of the toxicity of dioxins showed:

-Fat tissue: 6 specimens

The mean value was 13 pg-TEQ/g wet weight, and the median value was 13 pg-TEQ/g wet weight.

The range detected was 5.4–27 pg-TEQ/g wet weight.

-Muscle tissue: 4 specimens

The mean value was 7.1 pg-TEQ/g wet weight, and the median value was 3.0 pg-TEQ/g wet weight.

The range detected was 0.48–22 pg-TEQ/g wet weight.

-Muscle and fat tissue: 10 specimens

The mean value was 4.4 pg-TEQ/g wet weight, and the median value was 2.9 pg-TEQ/g wet weight.

The range detected was 0.33–18 pg-TEQ/g wet weight.

-Fat tissue and liver: 5 specimens

The mean value was 5.6 pg-TEQ/g wet weight, and the median value was 2.3 pg-TEQ/g wet weight.

The range detected was 1.7–19 pg-TEQ/g wet weight.

-Fat tissue, liver, and muscle: 5 specimens

The mean value was 4.2 pg-TEQ/g wet weight, and the median value was 2.2 pg-TEQ/g wet weight.

The range detected was 0.82–9.4 pg-TEQ/g wet weight.

Co-planar PCBs accounted for 31% of the total TEQ value when compared in terms of overall mean values, and 30% when the median values were compared.

(10) Land Mammals (Bears)

○ Habitat

Bears primarily inhabit deciduous broad-leaved forests (Japanese beech groves) in the cool temperate zones in Hokkaido, Honshu, and Shikoku. Their living range extends from several to 80 km^2. They hibernate in burrows and hollow trees during the winter.

○ Feeding Habits

Bears are omnivorous but mainly herbivorous, eating the shoots, nuts, and berries of trees, and plant stems, roots, and berries. Sometimes they also feed on insects such as bees and ants, carrion deer and serow, and the young of deer. The brown bear is more carnivorous, and in some parts of the Shiretoko Peninsula, it also catches salmon to eat.

(a) Number of Specimens

16 specimens

(b) Method of Collection

Individual specimens from nuisance wildlife extermination activity

(c) Test Samples

Fat tissue, liver

(d) Items Measured

Dioxins: Concentration and toxicity

(e) Calculation Method

Wet weight (fat weight figures appended for reference)

The toxic equivalency factors (TEFs) used were from WHO TEF, 1998 (mammals).

Isomers that were detected at levels below the lower limit of determination were assigned a zero value.

Concentrations below the lower limit of determination were converted to TEQ values equivalent to the lower limit of determination or half of that lower limit, and those TEQ values are shown in a separate table for reference.

(f) Analysis Method

Refer to the manual.

(g) Findings

See appended materials.

Evaluation of the toxicity of dioxins showed:

-Fat tissue: 10 specimens

The mean value was 0.45 pg-TEQ/g wet weight, and the median value was 0.29 pg-TEQ/g wet weight.

The range detected was 0.080–2.1 pg-TEQ/g wet weight.

-Fat tissue and liver: 6 specimens

The mean value was 0.45 pg-TEQ/g wet weight, and the median value was 0.29 pg-TEQ/g wet weight.

The range detected was 0.18–1.1 pg-TEQ/g wet weight.

Co-planar PCBs accounted for 33% of the total TEQ value when compared in terms of overall mean values, and 24% when the median values were compared.

(11) Land Mammals (Raccoon Dogs)

○ Habitat

Raccoon dogs inhabit wooded areas, forest fringes, and semi-cultivated hillsides near human habitation from plains to sub-alpine regions. They are also seen sometimes in suburban residential areas.

○ Feeding Habits

The raccoon dog is an omnivorous animal that feeds on fruit, nuts, grains, insects, worms, crustaceans, snakes, frogs, field mice, birds, etc. Beetle larvae, worms, and other creatures that burrow in the earth form a relatively large part of its diet.

Its activity range is restricted near urban areas, but in mountainous regions may extend from several dozen to several hundred hectares.

(a) Number of Specimens

11 specimens

(b) Method of Collection

Individual specimens that died after being rescued and others from nuisance wildlife extermination activity

(c) Test Samples

Fat tissue, Liver (some muscle tissue included)

(d) Items Measured

Dioxins: Concentration and toxicity

(e) Calculation Method

Wet weight (fat weight figures appended for reference)

The toxic equivalency factors (TEFs) used were from WHO TEF, 1998 (mammals).

Isomers that were detected at levels below the lower limit of determination were assigned a zero value.

Concentrations below the lower limit of determination were converted to TEQ values equivalent to the lower limit of determination or half of that lower limit, and those TEQ values are shown in a separate table for reference.

(f) Analysis Method

Refer to the manual.

(g) Findings

See appended materials.

Evaluation of the toxicity of dioxins showed:

-Fat tissue: 1 specimen

28 pg-TEQ/g wet weight

-Liver: 4 specimens

The mean value was 23 pg-TEQ/g wet weight, and the median value was 21 pg-TEQ/g wet weight.

The range detected was 9.7–42 pg-TEQ/g wet weight.

-Fat tissue and liver: 5 specimens

The mean value was 34 pg-TEQ/g wet weight, and the median value was 19 pg-TEQ/g wet weight.

The range detected was 13–100 pg-TEQ/g wet weight.

-Fat tissue, liver, and muscle tissue: 1 specimen

9.7 pg-TEQ/g wet weight

Co-planar PCBs accounted for 31% of the total TEQ value when compared in terms of overall mean values,

and 33% when the median values were compared.

(12) Land Mammals (Sika Deer)

○ Habitat

Sika deer mainly inhabit forests and forest fringes in mountainous areas. In areas with snow cover, they go through seasonal migration, so their activity range varies by region, from as little as 0.6–1.4 km^2 to as much as 20 km^2 in some regions.

○ Feeding Habits

This herbivorous animal feeds on the leaves of pasania, *tabu* (*Machilus thunbergii*) and other trees, grasses, acorns from evergreen oaks, bamboo grass, etc.

(a) Number of Specimens

78 specimens

(b) Method of Collection

Individual specimens from nuisance wildlife extermination activity and others captured for scientific purposes

(c) Test Samples

Liver, kidney, fat tissue

(d) Items Measured

Dioxins: Concentration and toxicity

(e) Calculation Method

Wet weight (fat weight figures appended for reference)

The toxic equivalency factors (TEFs) used were from WHO TEF, 1998 (mammals).

Isomers that were detected at levels below the lower limit of determination were assigned a zero value.

Concentrations below the lower limit of determination were converted to TEQ values equivalent to the lower limit of determination or half of that lower limit, and those TEQ values are shown in a separate table for reference.

(f) Analysis Method

Refer to the manual.

(g) Findings

See appended materials.

Evaluation of the toxicity of dioxins showed:

-Liver: 25 specimens

The mean value was 3.5 pg-TEQ/g wet weight, and the median value was 3.3 pg-TEQ/g wet weight.

The range detected was 0.93–10 pg-TEQ/g wet weight.

-Fat tissue and liver: 5 specimens

The mean value was 4.5 pg-TEQ/g wet weight, and the median value was 5.2 pg-TEQ/g wet weight.

The range detected was 1.4–6.1 pg-TEQ/g wet weight.

-Kidney: 28 specimens

The mean value was 1.9 pg-TEQ/g wet weight, and the median value was 0.71 pg-TEQ/g wet weight.

The range detected was 0.43–11 pg-TEQ/g wet weight.

-Fat tissue and kidney: 20 specimens

The mean value was 5.3 pg-TEQ/g wet weight, and the median value was 4.8 pg-TEQ/g wet weight.

The range detected was 2.0–10 pg-TEQ/g wet weight.

Co-planar PCBs accounted for 36% of the total TEQ value when compared in terms of overall mean values, and 32% when the median values were compared.

3. Research Team Evaluation of Findings

The results of this survey point to a tendency for predators that are higher in the ecosystem food chain, such as kites and raptors, to show higher accumulations of dioxins than animals that feed from lower in the food chain. In addition, terrestrial organisms had relatively higher accumulations of PCDDs and PCDFs, while marine organisms tended to have higher accumulations of co-planar PCBs.

With the present survey, however, individual specimens and samples were collected under varying conditions, the species also varied in their body size and the amount of fat they contained, and the number of samples was small. Therefore it was not possible to fully ascertain the relevant differences between species and regions.

4. Future Plans

Future plans call for narrowing the focus of study to certain species in light of the present findings, in order to verify the impact of measures that are implemented on the basis of the Law Concerning Special Measures Against Dioxins and the Basic Guidelines of Japan for the Promotion of Measures against Dioxins. By targeting

for further study those birds, marine mammals, and other species that are thought to have shown high concentrations of dioxins, future surveys will at the same time make it possible to track the state of accumulation of dioxins.

State of Dioxin Accumulation in Wildlife (FY. 1998) (TEQ by wet weight)

The values in () for carp, frogs, birds are calculated using TEF for mammals

Species		fat content	PCDDs	PCDFs	PCDDs+PCDFs	Coplanar PCBs	PCDDs+PCDFs +Co-PCBs
	unit	%	pgTEQ/g	pgTEQ/g	pgTEQ/g	pgTEQ/g	pgTEQ/g
Carp	mean	1.8	0.72(0.70)	0.50(0.56)	1.2(1.3)	0.078(1.7)	1.3(3.0)
	median	1.3	0.60(0.60)	0.37(0.43)	1.1(1.1)	0.065(1.5)	1.1(2.8)
N=48	maximum	4.9	2.9(2.9)	2.7(2.8)	5.6(5.7)	0.32(6.5)	5.9(11)
	minimum	0.49	0.11(0.11)	0.056(0.066)	0.20(0.20)	0.0069(0.34)	0.20(0.56)
Frogs	mean	1.1	1.3(1.2)	1.3(1.5)	2.6(2.7)	0.066(1.4)	2.7(4.1)
	median	1.0	1.2(1.1)	1.3(1.5)	2.5(2.6)	0.064(1.3)	2.6(4.0)
N=80	maximum	2.8	3.6(3.3)	3.7(4.0)	7.3(7.3)	0.15(3.3)	7.5(11)
	minimum	0.50	0.00057(0.0060)	0.18(0.23)	0.18(0.24)	0.012(0.26)	0.20(0.50)
Domestic Pigeon	mean	5.3	0.077(0.11)	0.68(0.35)	0.76(0.45)	0.23(0.34)	0.98(0.79)
(muscle,liver)	median	5.0	0.0048(0.053)	0.54(0.28)	0.74(0.51)	0.12(0.19)	0.99(0.67)
N=5	maximum	6.1	0.20(0.24)	1.0(0.53)	1.2(0.77)	0.71(1.1)	1.3(1.3)
	minimum	5.0	<0.27(0.00027)	0.35(0.18)	0.35(0.18)	0.012(0.060)	0.55(0.40)
	mean	4.9	2.7(3.4)	1.9(1.1)	4.6(4.5)	0.18(0.23)	4.7(4.7)
(muscle,liver,kidney)	median	4.9	2.7(3.4)	1.9(1.1)	4.6(4.5)	0.18(0.23)	4.7(4.7)
N=2	maximum	5.7	3.1(3.6)	2.4(1.5)	4.7(4.8)	0.23(0.27)	4.9(5.0)
	minimum	4.2	2.3(3.3)	1.3(0.70)	4.4.(4.3)	0.12(0.18)	4.5(4.4)
	mean	7.8	1.4(2.0)	1.2(0.75)	2.6(2.8)	1.5(1.5)	4.1(4.2)
(muscle,liver,kidney,	median	7.5	0.86(1.4)	1.1(0.63)	2.3(2.4)	0.14(0.22)	2.5(2.6)
fat)	maximum	11	3.1(4.4)	2.3(1.4)	5.4(5.7)	6.3(5.9)	10(10)
N=8	minimum	4.4	0.35(0.50)	0.36(0.24)	0.88(0.80)	0.0050(0.024)	0.99(1.1)
Kite	mean	6.0	11(11)	6.4(3.2)	17(15)	72(89)	89(100)
(muscle)	median	4.5	4.9(5.1)	3.3(1.6)	9.7(7.3)	26(27)	40(42)
N=8	maximum	14	27(28)	29(15)	51(38)	340(430)	390(470)
	minimum	1.8	1.0(1.1)	0.86(0.41)	2.8(2.2)	6.6(8.9)	9.4(11)
	mean	16	21(22)	14(7.2)	35(29)	65(57)	99(86)
(muscle,fat)	median	16	14(14)	12(5.5)	25(20)	60(58)	92(78)
N=20	maximum	28	100(110)	28(15)	130(120)	150(100)	220(220)
	minimum	7.6	3.3(3.4)	5.1(2.4)	8.5(5.8)	13(7.0)	22(13)
Raptors: Blakiston's	mean	23	6.3(6.5)	16(4.4)	23(11)	56(39)	79(49)
Fish-owl	median	21	6.3(6.4)	15(4.0)	20(10)	57(36)	76(45)
(muscle,fat)	maximum	43	7.5(7.7)	26(6.3)	33(14)	76(59)	96(70)
N=4	minimum	7.5	5.3(5.5)	10(3.3)	17(9.3)	33(23)	66(37)
Raptors: Others	mean	10	20(24)	110(59)	130(83)	25(33)	160(120)
(liver)	median	11	16(20)	31(16)	58(46)	16(17)	74(63)
N=5	maximum	13	49(58)	410(220)	460(270)	70(110)	530(380)
	minimum	8.3	1.5(1.8)	6.8(3.4)	8.3(5.1)	5.6(5.2)	14(10)
Whales	mean	77	2.4	3.1	5.5	83	88
(fat)	median	82	2.1	3.2	5.6	75	81
N=22	maximum	98	10	7.5	16	200	200
	minimum	36	0.082	<0.05	0.19	0.92	1.3
Seals	mean	86	2.1	0.66	2.7	14	17
(fat)	median	83	2.2	0.63	2.9	14	17
N=13	maximum	98	3.0	0.95	3.9	24	27
	minimum	77	0.95	0.33	1.3	7.3	8.6
Wood mouse	mean	4.7	3.3	24	28	11	39
(Whole body)	median	4.1	1.3	18	20	7.4	35
N=37	maximum	11	22	71	77	60	120
	minimum	2.2	0.00088	0.32	0.32	0.11	0.52
Japanese Macaque	mean	75	4.6	4.4	9.1	4.2	13
(fat)	median	74	5.1	4.4	9.5	3.6	13
N=6	maximum	90	8.5	8.2	17	10	27
	minimum	53	1.5	2.1	3.6	1.8	5.4

State of Dioxin Accumulation in Wildlife (FY. 1998) (TEQ by wet weight)

Species		fat content	PCDDs	PCDFs	PCDDs+PCDFs	Coplanar PCBs	PCDDs+PCDFs +Co-PCBs
	unit	%	pgTEQ/g	pgTEQ/g	pgTEQ/g	pgTEQ/g	pgTEQ/g
Japanese Macaque	mean	25	2.9	2.0	4.9	2.2	7.1
(muscle)	median	16	0.96	1.2	2.2	0.81	3.0
N=4	maximum	59	9.5	5.4	15	7.0	22
	minimum	11	0.16	0.13	0.28	0.20	0.48
	mean	38	1.6	1.4	3.1	1.3	4.4
(fat,muscle)	median	35	0.63	1.1	1.8	1.0	2.9
N=10	maximum	63	7.5	5.2	13	5.5	18
	minimum	20	0.039	0.21	0.24	0.082	0.33
	mean	35	2.0	1.9	3.8	1.7	5.6
(muscle,liver)	median	36	0.81	0.83	1.7	0.89	2.3
N=5	maximum	55	7.2	6.2	13	5.8	19
	minimum	3.6	0.44	0.73	1.2	0.50	1.7
	mean	39	1.7	1.3	2.9	1.3	4.2
(fat,liver, muscle)	median	36	0.59	1.0	1.6	0.61	2.2
N=5	maximum	57	3.9	2.8	6.6	2.8	9.4
	minimum	26	0.28	0.23	0.51	0.31	0.82
Bears	mean	88	0.13	0.13	0.26	0.18	0.45
(fat)	median	91	0.097	0.083	0.19	0.10	0.29
	maximum	96	0.50	0.47	1.0	1.1	2.1
N=10	minimum	70	0.000055	0.044	0.057	0.023	0.080
	mean	77	0.061	0.30	0.36	0.086	0.45
(fat,liver)	median	82	0.070	0.16	0.24	0.051	0.29
N=6	maximum	90	0.11	0.71	0.78	0.28	1.1
	minimum	49	0.0023	0.13	0.15	0.019	0.18
Racoon Dog	mean	10	4.2	17	20	2.5	23
(liver)	median	11	3.3	12	17	1.6	21
N=4	maximum	14	8.6	35	40	6.2	42
	minimum	4.1	1.4	7.4	8.8	0.64	9.7
	mean	76	14	6.0	20	14	34
(fat,liver)	median	76	8.6	4.6	13	6.4	19
N=5	maximum	97	43	11	54	46	100
	minimum	55	5.6	2.1	10	2.7	13
(fat) N=1		82	10	6.3	17	11	28
(fat,liver,muscle) N=1		66	5.6	1.7	7.3	2.4	9.7
Sika Deer	mean	7.1	0.61	1.9	2.5	1.0	3.5
(liver)	median	6.8	0.40	1.3	1.7	0.96	3.3
N=25	maximum	11	2.1	6.6	8.7	4.2	10
	minimum	4.0	0.0031	0.29	0.39	0.38	0.93
	mean	23	0.52	2.7	3.2	1.3	4.5
(fat,liver)	median	26	0.62	2.8	3.6	1.2	5.2
N=5	maximum	29	0.81	3.6	4.2	2.0	6.1
	minimum	10	0.00025	0.72	0.72	0.64	1.4
	mean	5.9	0.90	0.60	1.5	0.35	1.9
(kidney)	median	4.4	0.36	0.28	0.60	0.11	0.71
N=28	maximum	15	5.8	3.1	8.9	1.9	11
	minimum	2.0	0.19	0.14	0.37	0.044	0.43
	mean	34	1.4	1.2	2.6	2.7	5.3
(fat,kidney)	median	37	1.2	1.1	2.3	2.3	4.8
N=20	maximum	54	2.7	2.3	4.9	5.5	10
	minimum	12	0.47	0.49	0.99	0.98	2.0

State of Dioxin Accumulation in Wildlife (FY. 1998) (TEQ by fat weight)
The values in () for carp, frogs, birds are calculated using TEF for mammals

Species		fat content	PCDDs	PCDFs	PCDDs+PCDFs	Coplanar PCBs	PCDDs+PCDFs +Co-PCBs
	unit	%	pgTEQ/g	pgTEQ/g	pgTEQ/g	pgTEQ/g	pgTEQ/g
Carp	mean	1.8	49(48)	29(32)	78(81)	5.0(130)	83(210)
	median	1.3	36(36)	24(28)	63(65)	3.8(91)	66(150)
N=48	maximum	4.9	270(260)	110(110)	370(360)	18(550)	380(840)
	minimum	0.49	7.9(7.9)	6.1(6.4)	14(14)	0.50(28)	14(42)
Frogs	mean	1.1	120(110)	130(48)	240(160)	6.1(130)	250(290)
	median	1.0	97(93)	110(1.2)	210(99)	5.5(120)	210(230)
N=80	maximum	2.8	340(310)	320(340)	660(640)	19(390)	680(970)
	minimum	0.50	0.088(0.93)	18(0.20)	28(1.3)	0.57(12)	30(28)
Domestic Pigeon	mean	6.6	19(26)	20(12)	39(38)	13(13)	51(51)
	median	5.7	7.4(9.8)	14(7.2)	21(16)	2.4(4.0)	22(22)
N=15	maximum	11	54(78)	58(36)	110(110)	77(73)	150(150)
	minimum	4.2	<4.4(0.0050)	3.2(2.1)	6.5(3.3)	0.047(0.23)	9.0(7.4)
Kite	mean	13	210(220)	130(66)	340(280)	1,000(1,100)	1,400(1,400)
	median	14	80(83)	78(41)	180(130)	450(380)	580(490)
N=28	maximum	28	950(990)	1,100(575)	1,900(1,400)	13,000(16,000)	15,000(18,000)
	minimum	1.8	10(10)	10(5.3)	20(15)	47(45)	66(78)
Raptors	mean	16	110(130)	580(290)	680(420)	280(270)	970(690)
	median	11	71(73)	200(56)	270(130)	300(170)	480(400)
N=9	maximum	43	380(450)	3,200(1,700)	3,500(2,100)	620(820)	4,100(2,900)
	minimum	7.5	17(18)	56(13)	77(33)	65(54)	150(86)
Whales	mean	77	3.0	4.0	6.9	113	120
	median	82	2.6	4.2	7.0	93	99
N=22	maximum	98	10	9.7	19	450	470
	minimum	36	0.10	<0.07	0.22	2.6	3.5
Seals	mean	86	2.5	0.77	3.2	16	20
	median	83	2.5	0.71	3.2	16	20
N=13	maximum	98	3.7	1.2	4.6	28	31
	minimum	77	1.1	0.40	1.5	8.9	10
Wood mouse	mean	4.7	81	620	710	260	970
	median	4.1	24	440	480	180	860
N=37	maximum	11	540	1,900	2,000	1,500	2,900
	minimum	2.2	0.021	7.7	7.7	1.7	12
Japanese Macaque	mean	43	8.6	7.1	16	6.8	23
	median	40	3.5	3.1	6.6	3.2	10
N=30	maximum	90	83	47	130	61	190
	minimum	3.6	0.12	0.21	0.48	0.26	0.82
Bears	mean	84	0.12	0.26	0.39	0.26	0.65
	median	87	0.11	0.17	0.26	0.091	0.34
N=16	maximum	96	0.56	1.5	1.6	1.7	3.3
	minimum	49	0.000059	0.048	0.082	0.026	0.12
Raccoon Dog	mean	51	36	76	110	26	140
	median	66	12	10	20	10	34
N=11	maximum	97	210	370	470	150	620
	minimum	4.1	7.3	2.6	11	3.6	15
Sika Dear	mean	15	11	17	28	10	38
	median	8	6.1	7.8	14	6.7	18
N=78	maximum	54	180	170	280	69	330
	minimum	2.0	0.0012	1.2	2.8	0.46	3.2

State of Dioxin Accumulation in Wildlife (FY. 1998) (1) (TEQ by wet weight)

The values in () for carp, frogs, birds are calculated using TEF for mammals

Species	Compounds analyzed	unit	*Note	mean	median	maximum	minimum
Carp	fat content	%		1.8	1.3	4.9	0.49
N=48	PCDDs	pgTEQ/g	ND=0*QL	0.72(0.70)	0.60(0.60)	2.9(2.9)	0.11(0.11)
			ND=1/2*QL	0.73(0.71)	0.62(0.60)	2.9(2.9)	0.16(0.15)
			ND=1*QL	0.74(0.72)	0.62(0.61)	2.9(2.9)	0.21(0.19)
	PCDFs	pgTEQ/g	ND=0*QL	0.50(0.56)	0.37(0.43)	2.7(2.8)	0.056(0.066)
			ND=1/2*QL	0.52(0.58)	0.39(0.44)	2.7(2.8)	0.077(0.088)
			ND=1*QL	0.53(0.59)	0.40(0.45)	2.7(2.8)	0.098(0.11)
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	1.2(1.3)	1.1(1.1)	5.6(5.7)	0.20(0.20)
			ND=1/2*QL	1.2(1.3)	1.1(1.1)	5.6(5.7)	0.27(0.26)
			ND=1*QL	1.3(1.3)	1.1(1.1)	5.6(5.7)	0.34(0.33)
	Coplanar PCBs	pgTEQ/g	ND=0*QL	0.078(1.7)	0.065(1.5)	0.32(6.5)	0.0069(0.34)
			ND=1/2*QL	0.078(1.7)	0.065(1.5)	0.32(6.5)	0.0069(0.34)
			ND=1*QL	0.078(1.7)	0.065(1.5)	0.32(6.5)	0.0069(0.34)
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	1.3(3.0)	1.1(2.8)	5.9(11)	0.20(0.56)
			ND=1/2*QL	1.3(3.0)	1.1(2.9)	5.9(11)	0.27(0.62)
			ND=1*QL	1.4(3.0)	1.2(2.9)	5.9(11)	0.35(0.68)
Frogs	fat content	%		1.1	1.0	2.8	0.50
N=80	PCDDs	pgTEQ/g	ND=0*QL	1.3(1.2)	1.2(1.1)	3.6(3.3)	0.00057(0.0060)
			ND=1/2*QL	1.3(1.2)	1.3(1.2)	3.6(3.3)	0.27(0.27)
			ND=1*QL	1.4(1.3)	1.4(1.2)	3.6(3.3)	0.37(0.34)
	PCDFs	pgTEQ/g	ND=0*QL	1.3(1.5)	1.3(1.5)	3.7(4.0)	0.18(0.23)
			ND=1/2*QL	1.4(1.5)	1.3(1.5)	3.7(4.0)	0.29(0.33)
			ND=1*QL	1.4(1.6)	1.4(1.5)	3.8(4.0)	0.34(0.39)
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	2.6(2.7)	2.5(2.6)	7.3(7.3)	0.18(0.24)
			ND=1/2*QL	2.7(2.7)	2.6(2.7)	7.3(7.3)	0.61(0.61)
			ND=1*QL	2.8(2.8)	2.8(2.8)	7.3(7.4)	0.72(0.73)
	Coplanar PCBs	pgTEQ/g	ND=0*QL	0.066(1.4)	0.064(1.3)	0.15(3.3)	0.012(0.26)
			ND=1/2*QL	0.066(1.4)	0.064(1.3)	0.15(3.3)	0.012(0.26)
			ND=1*QL	0.066(1.4)	0.064(1.3)	0.15(3.3)	0.012(0.26)
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	2.7(4.1)	2.6(4.0)	7.5(11)	0.20(0.50)
			ND=1/2*QL	2.8(4.1)	2.7(4.1)	7.5(11)	0.62(0.88)
			ND=1*QL	2.8(4.2)	2.9(4.3)	7.5(11)	0.73(1.0)
Domestic Pgeon	fat contetn	%		5.3	5.0	6.1	5.0
(muscle, liver) N=5	PCDDs	pgTEQ/g	ND=0*QL	0.077(0.11)	0.0048(0.053)	0.20(0.24)	<0.27(0.00027)
			ND=1/2*QL	0.26(0.30)	0.27(0.32)	0.31(0.36)	0.16(0.18)
			ND=1*QL	0.44(0.50)	0.37(0.41)	0.63(0.71)	0.32(0.37)
	PCDFs	pgTEQ/g	ND=0*QL	0.68(0.35)	0.54(0.28)	1.0(0.53)	0.35(0.18)
			ND=1/2*QL	0.85(0.43)	0.79(0.40)	1.2(0.60)	0.49(0.24)
			ND=1*QL	1.0(0.52)	1.1(0.53)	1.4(0.71)	0.62(0.31)
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	0.76(0.45)	0.74(0.51)	1.2(0.77)	0.35(0.18)
			ND=1/2*QL	1.1(0.74)	1.1(0.76)	1.5(0.93)	0.65(0.43)
			ND=1*QL	1.5(1.0)	1..6(1.0)	2.0(1.3)	0.95(0.68)
	Coplanar PCBs	pgTEQ/g	ND=0*QL	0.23(0.34)	0.12(0.19)	0.71(1.1)	0.012(0.060)
			ND=1/2*QL	0.25(0.34)	0.14(0.19)	0.71(1.1)	0.074(0.085)
			ND=1*QL	0.27(0.35)	0.15(0.19))	0.71(1.1)	0.14(0.11)
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	0.98(0.79)	0.99(0.67)	1.3(1.3)	0.55(0.40)
			ND=1/2*QL	1.4(1.1)	1.5(1.0)	1.8(1.8)	0.85(0.65)
			ND=1*QL	1.7(1.4)	1.7(1.2)	2.4(2.3)	1.1(0.90)
(muscle, liver, kidney) N=2	fat contetnt	%		4.9	4.9	5.7	4.2
	PCDDs	pgTEQ/g	ND=0*QL	2.7(3.4)	2.7(3.4)	3.1(3.6)	2.3(3.3)
			ND=1/2*QL	2.7(3.4)	2.7(3.4)	3.1(3.6)	2.3(3.3)
			ND=1*QL	2.7(3.4)	2.7(3.4)	3.1(3.6)	2.3(3.3)
	PCDFs	pgTEQ/g	ND=0*QL	1.9(1.1)	1.9(1.1)	2.4(1.5)	1.3(0.70)
			ND=1/2*QL	1.9(1.1)	1.9(1.1)	2.5(1.5)	1.4(0.72)
			ND=1*QL	2.0(1.1)	2.0(1.1)	2.6(1.6)	1.4(0.73)
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	4.6(4.5)	4.6(4.5)	4.7(4.8)	4.4(4.3)
			ND=1/2*QL	4.6(4.5)	4.6(4.5)	4.8(4.8)	4.5(4.3)
			ND=1*QL	4.7(4.6)	4.7(4.6)	4.9(4.8)	4.5(4.3)
	Coplanar PCBs	pgTEQ/g	ND=0*QL	0.18(0.23)	0.18(0.23)	0.23(0.27)	0.12(0.18)
			ND=1/2*QL	0.19(0.23)	0.19(0.23)	0.25(0.27)	0.13(0.18)
			ND=1*QL	0.20(0.23)	0.20(0.23)	0.26(0.27)	0.14(0.18)
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	4.7(4.7)	4.7(4.7)	4.9(5.0)	4.5(4.4)
			ND=1/2*QL	4.8(4.8)	4.8(4.8)	5.0(5.1)	4.6(4.5)
			ND=1*QL	4.9(4.8)	4.9(4.8)	5.1(5.1)	4.6(4.5)

*Note ND=0*QL : calculated applying 0 as the concentration for the isomers below the detection limit

ND=1/2*QL : calculated applying 1/2 value of the detection limit as the concentration for the isomers below the detection limit.

ND=1*QL : calculated applying the value of the detection limit as the concentration for the isomers below the detection limit.

State of Dioxin Accumulation in Wildlife (FY. 1998) (2) (TEQ by wet weight)
The values in () for carp, frogs, birds are calculated using TEF for mammals

Species	Compounds analyzed	unit	*Note	mean	median	maximum	minimum
Domestic Pigeon (muscle, liver, kidney, fat) N=8	fat content	%		7.8	7.5	11	4.4
	PCDDs	pgTEQ/g	ND=0*QL	1.4(2.0)	0.86(1.4)	3.1(4.4)	0.35(0.50)
			ND=1/2*QL	1.4(2.1)	0.90(1.5)	3.2(4.4)	0.40(0.55)
			ND=1*QL	1.5(2.1)	0.95(1.5)	3.2(4.4)	0.45(0.60)
	PCDFs	pgTEQ/g	ND=0*QL	1.2(0.75)	1.1(0.63)	2.3(1.4)	0.36(0.24)
			ND=1/2*QL	1.3(0.77)	1.2(0.65)	2.4(1.4)	0.41(0.25)
			ND=1*QL	1.3(0.78)	1.2(0.67)	2.4(1.4)	0.47(0.27)
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	2.6(2.8)	2.3(2.4)	5.4(5.7)	0.88(0.80)
			ND=1/2*QL	2.7(2.8)	2.4(2.5)	5.5(5.8)	0.99(0.87)
			ND=1*QL	2.8(2.9)	2.5(2.5)	5.6(5.8)	1.1(0.94)
	Coplanar PCBs	pgTEQ/g	ND=0*QL	1.5(1.5)	0.14(0.22)	6.3(5.9)	0.0050(0.024)
			ND=1/2*QL	1.5(1.5)	0.14(0.22)	6.3(5.9)	0.030(0.034)
			ND=1*QL	1.5(1.5)	0.15(0.22)	6.3(5.9)	0.055(0.044)
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	4.1(4.2)	2.5(2.6)	10(10)	0.99(1.1)
			ND=1/2*QL	4.2(4.3)	2.6(2.7)	11(10)	1.1(1.2)
			ND=1*QL	4.3(4.3)	2.7(2.7)	11(10)	1.2(1.2)
Kite (muscle) N=8	fat content	%		6.0	4.5	14	1.8
	PCDDs	pgTEQ/g	ND=0*QL	11(11)	4.9(5.1)	27(28)	1.0(1.1)
			ND=1/2*QL	11(11)	4.9(5.1)	27(28)	1.0(1.1)
			ND=1*QL	11(11)	4.9(5.1)	27(28)	1.0(1.2)
	PCDFs	pgTEQ/g	ND=0*QL	6.4(3.2)	3.3(1.6)	29(15)	0.86(0.41)
			ND=1/2*QL	6.4(3.3)	3.2(1.6)	29(15)	0.89(0.44)
			ND=1*QL	6.5(3.3)	3.3(1.6)	29(15)	0.93(0.47)
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	17(15)	9.7(7.3)	51(38)	2.8(2.2)
			ND=1/2*QL	17(15)	9.5(7.3)	51(38)	3.0(2.2)
			ND=1*QL	17(15)	9.5(7.3)	51(38)	3.1(2.3)
	Coplanar PCBs	pgTEQ/g	ND=0*QL	72(89)	26(27)	340(430)	6.6(8.9)
			ND=1/2*QL	72(89)	26(27)	340(430)	6.6(8.9)
			ND=1*QL	73(89)	27(27)	350(430)	6.3(9.0)
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	89(100)	40(42)	390(470)	9.4(11)
			ND=1/2*QL	89(100)	40(42)	390(470)	9.6(11)
			ND=1*QL	90(100)	41(42)	400(470)	9.4(11)
(muscle, fat) N=20	fat contetn	%		16	16	28	7.6
	PCDDs	pgTEQ/g	ND=0*QL	21(22)	14(14)	100(110)	3.3(3.4)
			ND=1/2*QL	21(22)	14(14)	100(110)	3.3(3.4)
			ND=1*QL	21(22)	14(14)	100(110)	3.3(3.4)
	PCDFs	pgTEQ/g	ND=0*QL	14(7.2)	12(5.5)	28(15)	5.1(2.4)
			ND=1/2*QL	14(7.3)	12(5.5)	28(15)	5.1(2.4)
			ND=1*QL	14(7.3)	12(5.5)	28(15)	5.1(2.4)
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	35(29)	25(20)	130(120)	8.5(5.8)
			ND=1/2*QL	35(29)	25(20)	130(120)	8.5(5.8)
			ND=1*QL	35(29)	25(20)	130(120)	8.5(5.9)
	Coplanar PCBs	pgTEQ/g	ND=0*QL	65(57)	60(58)	150(100)	13(7.0)
			ND=1/2*QL	65(57)	60(58)	150(100)	13(7.0)
			ND=1*QL	65(57)	60(58)	150(100)	13(7.0)
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	99(86)	92(78)	220(220)	22(13)
			ND=1/2*QL	99(86)	92(78)	220(220)	22(13)
			ND=1*QL	99(86)	92(78)	220(220)	22(13)
Raptors Blakiston's Fish-owl (muscle, fat) N=4	fat contetnt	%		23	21	43	7.5
	PCDDs	pgTEQ/g	ND=0*QL	6.3(6.5)	6.3(6.4)	7.5(7.7)	5.3(5.5)
			ND=1/2*QL	6.3(6.5)	6.3(6.4)	7.5(7.7)	5.3(5.5)
			ND=1*QL	6.3(6.5)	6.3(6.4)	7.5(7.7)	5.3(5.5)
	PCDFs	pgTEQ/g	ND=0*QL	16(4.4)	15(4.0)	26(6.3)	10(3.3)
			ND=1/2*QL	16(4.4)	15(4.0)	26(6.3)	10(3.3)
			ND=1*QL	16(4.4)	15(4.0)	26(6.3)	10(3.3)
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	23(11)	20(10)	33(14)	17(9.3)
			ND=1/2*QL	23(11)	20(10)	33(14)	17(9.4)
			ND=1*QL	23(11)	20(10)	33(14)	17(9.4)
	Coplanar PCBs	pgTEQ/g	ND=0*QL	56(39)	57(36)	76(59)	33(23)
			ND=1/2*QL	56(39)	57(36)	77(59)	33(23)
			ND=1*QL	56(39)	57(36)	77(59)	33(23)
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	79(49)	76(45)	96(70)	66(37)
			ND=1/2*QL	79(49)	76(45)	97(70)	66(37)
			ND=1*QL	79(49)	76(45)	97(70)	66(37)

*Note ND=0*QL : calculated applying 0 as the concentration for the isomers below the detection limit
ND=1/2*QL : calculated applying 1/2 value of the detection limit as the concentration for the isomers below the detection limit.
ND=1*QL : calculated applying the value of the detection limit as the concentration for the isomers below the detection limit.

State of Dioxin Accumulation in Wildlife (FY. 1998) (3) (TEQ by wet weight)
The values in () for carp, frogs, birds are calculated using TEF for mammals

Species	Compounds analyzed	unit	*Note	mean	median	maximum	minimum
Raptors: Others (liver) N=5	fat content	%		10	11	13	8.3
	PCDDs	pgTEQ/g	ND=0*QL	20(24)	16(20)	49(58)	1.5(1.8)
			ND=1/2*QL	20(24)	16(20)	49(58)	1.5(1.8)
			ND=1*QL	21(24)	16(20)	48(58)	1.5(1.8)
	PCDFs	pgTEQ/g	ND=0*QL	110(59)	31(16)	410(220)	6.8(3.4)
			ND=1/2*QL	110(59)	31(16)	410(220)	6.8(3.4)
			ND=1*QL	110(59)	31(16)	410(220)	6.9(3.4)
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	130(83)	58(46)	460(270)	8.3(5.1)
			ND=1/2*QL	130(83)	59(46)	460(270)	8.3(5.2)
			ND=1*QL	130(83)	59(46)	460(270)	8.4(5.2)
	Coplanar PCBs	pgTEQ/g	ND=0*QL	25(33)	16(17)	70(110)	5.6(5.2)
			ND=1/2*QL	25(33)	16(17)	70(110)	5.6(5.2)
			ND=1*QL	25(33)	16(17)	70(110)	5.6(5.2)
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	160(120)	74(63)	530(380)	14(10)
			ND=1/2*QL	160(120)	74(63)	530(380)	14(10)
			ND=1*QL	160(120)	75(63)	530(380)	14(10)
Whales (fat) N=22	fat content	%		77	82	98	36
	PCDDs	pgTEQ/g	ND=0*QL	2.4	2.1	10	0.082
			ND=1/2*QL	2.4	2.2	10	0.14
			ND=1*QL	2.4	2.2	10	0.20
	PCDFs	pgTEQ/g	ND=0*QL	3.1	3.2	7.5	<0.05
			ND=1/2*QL	3.1	3.2	7.5	0.037
			ND=1*QL	3.1	3.2	7.5	0.075
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	5.5	5.6	16	0.19
			ND=1/2*QL	5.5	5.7	16	0.26
			ND=1*QL	5.5	5.7	16	0.33
	Coplanar PCBs	pgTEQ/g	ND=0*QL	83	75	200	0.92
			ND=1/2*QL	83	75	200	0.92
			ND=1*QL	83	75	200	0.92
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	88	81	200	1.3
			ND=1/2*QL	89	81	200	1.3
			ND=1*QL	89	81	200	1.4
Seals (fat) N=13	fat contetn	%		86	83	98	77
	PCDDs	pgTEQ/g	ND=0*QL	2.1	2.2	3.0	0.95
			ND=1/2*QL	2.1	2.2	3.0	0.96
			ND=1*QL	2.1	2.2	3.0	0.97
	PCDFs	pgTEQ/g	ND=0*QL	0.66	0.63	0.95	0.33
			ND=1/2*QL	0.67	0.64	0.98	0.35
			ND=1*QL	0.69	0.65	0.99	0.37
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	2.7	2.9	3.9	1.3
			ND=1/2*QL	2.8	2.9	3.9	1.3
			ND=1*QL	2.8	3.0	3.9	1.3
	Coplanar PCBs	pgTEQ/g	ND=0*QL	14	14	24	7.3
			ND=1/2*QL	14	14	24	7.3
			ND=1*QL	14	14	24	7.3
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	17	17	27	8.6
			ND=1/2*QL	17	17	27	8.6
			ND=1*QL	17	17	27	8.7
Wood Mouse (whole body) N=37	fat contetnt	%		4.7	4.1	11	2.2
	PCDDs	pgTEQ/g	ND=0*QL	3.3	1.3	22	0.00088
			ND=1/2*QL	3.9	2.0	22	0.42
			ND=1*QL	4.5	2.8	23	0.81
	PCDFs	pgTEQ/g	ND=0*QL	24	18	71	0.32
			ND=1/2*QL	25	18	71	0.50
			ND=1*QL	25	18	71	0.67
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	28	20	77	0.32
			ND=1/2*QL	28	20	78	1.1
			ND=1*QL	29	21	78	1.7
	Coplanar PCBs	pgTEQ/g	ND=0*QL	11	7.4	60	0.11
			ND=1/2*QL	11	7.4	60	0.12
			ND=1*QL	11	7.4	60	0.12
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	39	35	120	0.52
			ND=1/2*QL	40	36	120	1.3
			ND=1*QL	40	37	120	1.9

*Note ND=0*QL : calculated applying 0 as the concentration for the isomers below the detection limit
ND=1/2*QL : calculated applying 1/2 value of the detection limit as the concentration for the isomers below the detection limit.

State of Dioxin Accumulation in Wildlife (FY. 1998) (4) (TEQ by wet weight)
The values in () for carp, frogs, birds are calculated using TEF for mammals

Species	Compounds analyzed	unit	*Note	mean	median	maximum	minimum
Japanese Macaque (fat) N=6	fat content	%		75	74	90	53
	PCDDs	pgTEQ/g	ND=0*QL	4.6	5.1	8.5	1.5
			ND=1/2*QL	4.6	5.1	8.5	1.7
			ND=1*QL	4.6	5.1	8.5	1.9
	PCDFs	pgTEQ/g	ND=0*QL	4.4	4.4	8.2	2.1
			ND=1/2*QL	4.4	4.4	8.2	2.1
			ND=1*QL	4.4	4.4	8.2	2.1
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	9.1	9.5	17	3.6
			ND=1/2*QL	9.1	9.5	17	3.9
			ND=1*QL	9.1	9.5	17	4.0
	Coplanar PCBs	pgTEQ/g	ND=0*QL	4.2	3.6	10	1.8
			ND=1/2*QL	4.2	3.6	10	1.8
			ND=1*QL	4.2	3.6	10	1.8
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	13	13	27	5.4
			ND=1/2*QL	13	13	27	5.7
			ND=1*QL	13	13	27	5.8
(muscle) N=4	fat content	%		25	16	59	11
	PCDDs	pgTEQ/g	ND=0*QL	2.9	0.96	9.5	0.16
			ND=1/2*QL	2.9	0.96	9.5	0.22
			ND=1*QL	2.9	0.96	9.5	0.27
	PCDFs	pgTEQ/g	ND=0*QL	2.0	1.2	5.4	0.13
			ND=1/2*QL	2.0	1.2	5.4	0.16
			ND=1*QL	2.0	1.2	5.4	0.19
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	4.9	2.2	15	0.28
			ND=1/2*QL	4.9	2.2	15	0.37
			ND=1*QL	4.9	2.2	15	0.46
	Coplanar PCBs	pgTEQ/g	ND=0*QL	2.2	0.81	7.0	0.20
			ND=1/2*QL	2.2	0.81	7.0	0.20
			ND=1*QL	2.2	0.81	7.0	0.20
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	7.1	3.0	22	0.48
			ND=1/2*QL	7.1	3.0	22	0.57
			ND=1*QL	7.1	3.0	22	0.66
(fat,muscle) N=10	fat contetn	%		38	35	63	20
	PCDDs	pgTEQ/g	ND=0*QL	1.6	0.63	7.5	0.039
			ND=1/2*QL	1.7	0.65	7.5	0.094
			ND=1*QL	1.7	0.67	7.5	0.15
	PCDFs	pgTEQ/g	ND=0*QL	1.4	1.1	5.2	0.21
			ND=1/2*QL	1.4	1.1	5.2	0.21
			ND=1*QL	1.4	1.1	5.2	0.22
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	3.1	1.8	13	0.24
			ND=1/2*QL	3.1	1.8	13	0.31
			ND=1*QL	3.1	1.8	13	0.37
	Coplanar PCBs	pgTEQ/g	ND=0*QL	1.3	1.0	5.5	0.082
			ND=1/2*QL	1.3	1.0	5.5	0.082
			ND=1*QL	1.3	1.0	5.5	0.082
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	4.4	2.9	18	0.33
			ND=1/2*QL	4.4	2.9	18	0.39
			ND=1*QL	4.5	2.9	18	0.45
(fat,liver) N=5	fat contetnt	%		35	36	55	3.6
	PCDDs	pgTEQ/g	ND=0*QL	2.0	0.81	7.2	0.44
			ND=1/2*QL	2.0	0.81	7.2	0.44
			ND=1*QL	2.0	0.81	7.2	0.44
	PCDFs	pgTEQ/g	ND=0*QL	1.9	0.83	6.2	0.73
			ND=1/2*QL	1.9	0.83	6.2	0.75
			ND=1*QL	1.9	0.83	6.2	0.76
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	3.8	1.7	13	1.2
			ND=1/2*QL	3.9	1.7	13	1.2
			ND=1*QL	3.9	1.7	13	1.2
	Coplanar PCBs	pgTEQ/g	ND=0*QL	1.7	0.89	5.8	0.50
			ND=1/2*QL	1.8	0.89	5.8	0.50
			ND=1*QL	1.8	0.89	5.8	0.50
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	5.6	2.3	19	1.7
			ND=1/2*QL	5.6	2.3	19	1.7
			ND=1*QL	5.6	2.3	19	1.7

*Note ND=0*QL : calculated applying 0 as the concentration for the isomers below the detection limit
ND=1/2*QL : calculated applying 1/2 value of the detection limit as the concentration for the isomers below the detection limit.
ND=1*QL : calculated applying the value of the detection limit as the concentration for the isomers below the detection limit.

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State of Dioxin Accumulation in Wildlife (FY. 1998) (5) (TEQ by wet weight)
The values in () for carp, frogs, birds are calculated using TEF for mammals

Species	Compounds analyzed	unit	*Note	mean	median	maximum	minimum
Japanese Macaque (fat,kidney,muscle) N=5	fat content	%		39	36	57	26
	PCDDs	pgTEQ/g	ND=0*QL	1.7	0.59	3.9	0.28
			ND=1/2*QL	1.7	0.59	3.9	0.29
			ND=1*QL	1.7	0.59	3.9	0.30
	PCDFs	pgTEQ/g	ND=0*QL	1.3	1.0	2.8	0.23
			ND=1/2*QL	1.3	1.0	2.8	0.25
			ND=1*QL	1.3	1.0	2.8	0.26
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	2.9	1.6	6.6	0.51
			ND=1/2*QL	2.9	1.6	6.6	0.54
			ND=1*QL	3.0	1.6	6.6	0.57
	Coplanar PCBs	pgTEQ/g	ND=0*QL	1.3	0.61	2.8	0.31
			ND=1/2*QL	1.3	0.61	2.8	0.31
			ND=1*QL	1.3	0.61	2.8	0.31
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	4.2	2.2	9.4	0.82
			ND=1/2*QL	4.2	2.2	9.4	0.85
			ND=1*QL	4.2	2.2	9.4	0.88
Bears (fat) N=10	fat content	%		88	91	96	70
	PCDDs	pgTEQ/g	ND=0*QL	0.13	0.097	0.50	0.000055
			ND=1/2*QL	0.17	0.13	0.50	0.067
			ND=1*QL	0.21	0.17	0.51	0.13
	PCDFs	pgTEQ/g	ND=0*QL	0.13	0.083	0.47	0.044
			ND=1/2*QL	0.15	0.10	0.48	0.068
			ND=1*QL	0.17	0.13	0.49	0.093
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	0.26	0.19	1.0	0.057
			ND=1/2*QL	0.32	0.24	1.0	0.15
			ND=1*QL	0.38	0.31	1.0	0.24
	Coplanar PCBs	pgTEQ/g	ND=0*QL	0.18	0.10	1.1	0.023
			ND=1/2*QL	0.18	0.10	1.1	0.023
			ND=1*QL	0.18	0.10	1.1	0.024
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	0.45	0.29	2.1	0.080
			ND=1/2*QL	0.50	0.35	2.1	0.17
			ND=1*QL	0.56	0.43	2.1	0.26
(fat,liver) N=6	fat contetn	%		77	82	90	49
	PCDDs	pgTEQ/g	ND=0*QL	0.061	0.070	0.11	0.0023
			ND=1/2*QL	0.11	0.11	0.14	0.067
			ND=1*QL	0.16	0.16	0.18	0.13
	PCDFs	pgTEQ/g	ND=0*QL	0.30	0.16	0.71	0.13
			ND=1/2*QL	0.31	0.17	0.74	0.15
			ND=1*QL	0.32	0.19	0.75	0.16
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	0.36	0.23	0.80	0.15
			ND=1/2*QL	0.42	0.28	0.87	0.23
			ND=1*QL	0.48	0.34	0.93	0.30
	Coplanar PCBs	pgTEQ/g	ND=0*QL	0.086	0.051	0.28	0.019
			ND=1/2*QL	0.086	0.051	0.28	0.024
			ND=1*QL	0.087	0.051	0.28	0.029
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	0.45	0.29	1.1	0.18
			ND=1/2*QL	0.50	0.33	1.1	0.26
			ND=1*QL	0.56	0.38	1.2	0.34
Racoon Dog (liver) N=4	fat contetnt	%		10	11	14	4.1
	PCDDs	pgTEQ/g	ND=0*QL	4.2	3.3	8.6	1.4
			ND=1/2*QL	4.2	3.3	8.6	1.4
			ND=1*QL	4.2	3.3	8.6	1.4
	PCDFs	pgTEQ/g	ND=0*QL	17	12	35	7.4
			ND=1/2*QL	17	12	35	7.4
			ND=1*QL	17	12	35	7.4
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	20	17	40	8.8
			ND=1/2*QL	20	17	40	8.8
			ND=1*QL	20	17	40	8.8
	Coplanar PCBs	pgTEQ/g	ND=0*QL	2.5	1.6	6.2	0.64
			ND=1/2*QL	2.5	1.6	6.2	0.64
			ND=1*QL	2.5	1.6	6.2	0.64
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	23	21	42	9.7
			ND=1/2*QL	23	21	42	9.7
			ND=1*QL	23	21	42	9.7

*Note ND=0*QL : calculated applying 0 as the concentration for the isomers below the detection limit
ND=1/2*QL : calculated applying 1/2 value of the detection limit as the concentration for the isomers below the detection limit.
ND=1*QL : calculated applying the value of the detection limit as the concentration for the isomers below the detection limit.

State of Dioxin Accumulation in Wildlife (FY. 1998) (6) (TEQ by wet weight)
The values in () for carp, frogs, birds are calculated using TEF for mammals

Species	Compounds analyzed	unit	*Note	mean	median	maximum	minimum
Raccoon Dog (fat, liver) N=5	fat content	%		76	76	97	55
	PCDDs	pgTEQ/g	ND=0*QL	14	8.6	43	5.6
			ND=1/2*QL	14	8.6	43	5.6
			ND=1*QL	14	8.6	43	5.6
	PCDFs	pgTEQ/g	ND=0*QL	6.0	4.6	11	2.1
			ND=1/2*QL	6.0	4.6	11	2.1
			ND=1*QL	6.0	4.6	11	2.1
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	20	13	54	10
			ND=1/2*QL	20	13	54	10
			ND=1*QL	20	13	54	10
	Coplanar PCBs	pgTEQ/g	ND=0*QL	14	6.4	46	2.7
			ND=1/2*QL	14	6.4	46	2.7
			ND=1*QL	14	6.4	46	2.7
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	34	19	100	13
			ND=1/2*QL	34	19	100	13
			ND=1*QL	34	19	100	13
(fat) N=1	fat content	%		82			
	PCDDs	pgTEQ/g	ND=0*QL	10			
			ND=1/2*QL	10			
			ND=1*QL	10			
	PCDFs	pgTEQ/g	ND=0*QL	6.3			
			ND=1/2*QL	6.3			
			ND=1*QL	6.3			
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	17			
			ND=1/2*QL	17			
			ND=1*QL	17			
	Coplanar PCBs	pgTEQ/g	ND=0*QL	11			
			ND=1/2*QL	11			
			ND=1*QL	11			
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	28			
			ND=1/2*QL	28			
			ND=1*QL	28			
(fat,liver, muscle) N=1	fat contetn	%		66			
	PCDDs	pgTEQ/g	ND=0*QL	5.6			
			ND=1/2*QL	5.6			
			ND=1*QL	5.6			
	PCDFs	pgTEQ/g	ND=0*QL	1.7			
			ND=1/2*QL	1.7			
			ND=1*QL	1.7			
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	7.3			
			ND=1/2*QL	7.3			
			ND=1*QL	7.3			
	Coplanar PCBs	pgTEQ/g	ND=0*QL	2.4			
			ND=1/2*QL	2.4			
			ND=1*QL	2.4			
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	9.7			
			ND=1/2*QL	9.7			
			ND=1*QL	9.7			
Sika Deer (liver) N=25	fat contetnt	%		7.1	6.8	11	4.0
	PCDDs	pgTEQ/g	ND=0*QL	0.61	0.40	2.1	0.0031
			ND=1/2*QL	0.62	0.42	2.1	0.081
			ND=1*QL	0.64	0.43	2.1	0.16
	PCDFs	pgTEQ/g	ND=0*QL	1.9	1.3	6.6	0.29
			ND=1/2*QL	1.9	1.3	6.8	0.30
			ND=1*QL	1.9	1.3	6.8	0.31
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	2.5	1.7	8.7	0.39
			ND=1/2*QL	2.5	1.7	8.9	0.44
			ND=1*QL	2.5	1.7	8.9	0.49
	Coplanar PCBs	pgTEQ/g	ND=0*QL	1.0	0.96	4.2	0.38
			ND=1/2*QL	1.1	0.99	4.2	0.39
			ND=1*QL	1.1	0.99	4.2	0.39
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	3.5	3.3	10	0.93
			ND=1/2*QL	3.5	3.3	10	0.98
			ND=1*QL	3.6	3.3	10	1.0

*Note ND=0*QL : calculated applying 0 as the concentration for the isomers below the detection limit
ND=1/2*QL : calculated applying 1/2 value of the detection limit as the concentration for the isomers below the detection limit.
ND=1*QL : calculated applying the value of the detection limit as the concentration for the isomers below the detection limit.

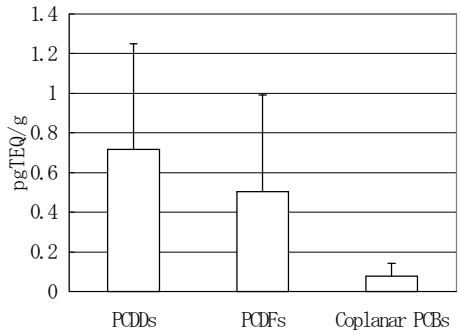
State of Dioxin Accumulation in Wildlife (FY. 1998) (7) (TEQ by wet weight)
The values in () for carp, frogs, birds are calculated using TEF for mammals

Species	Compounds analyzed	unit	*Note	mean	median	maximum	minimum
Sika Deer (fat, liver) N=5	fat content	%		23	26	29	10
	PCDDs	pgTEQ/g	ND=0*QL	0.52	0.62	0.81	0.00025
			ND=1/2*QL	0.59	0.62	0.81	0.33
			ND=1*QL	0.66	0.66	0.81	0.48
	PCDFs	pgTEQ/g	ND=0*QL	2.7	2.8	3.6	0.72
			ND=1/2*QL	2.7	2.8	3.6	0.77
			ND=1*QL	2.7	2.8	3.6	0.84
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	3.2	3.6	4.2	0.72
			ND=1/2*QL	3.3	3.6	4.2	1.1
			ND=1*QL	3.4	3.6	4.2	1.5
	Coplanar PCBs	pgTEQ/g	ND=0*QL	1.3	1.2	2.0	0.64
			ND=1/2*QL	1.3	1.2	2.1	0.65
			ND=1*QL	1.3	1.2	2.1	0.65
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	4.5	5.2	6.1	1.4
			ND=1/2*QL	4.6	5.2	6.1	1.7
			ND=1*QL	4.7	5.2	6.2	2.1
(kidney) N=28	fat content	%		5.9	4.4	15	2.0
	PCDDs	pgTEQ/g	ND=0*QL	0.90	0.36	5.8	0.19
			ND=1/2*QL	0.91	0.39	5.8	0.22
			ND=1*QL	0.94	0.41	5.8	0.24
	PCDFs	pgTEQ/g	ND=0*QL	0.60	0.28	3.1	0.14
			ND=1/2*QL	0.63	0.32	3.1	0.16
			ND=1*QL	0.66	0.35	3.1	0.18
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	1.5	0.60	8.9	0.37
			ND=1/2*QL	1.5	0.66	8.9	0.40
			ND=1*QL	1.6	0.72	8.9	0.44
	Coplanar PCBs	pgTEQ/g	ND=0*QL	0.35	0.11	1.9	0.044
			ND=1/2*QL	0.35	0.11	1.9	0.045
			ND=1*QL	0.35	0.11	1.9	0.046
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	1.9	0.71	11	0.43
			ND=1/2*QL	1.9	0.77	11	0.46
			ND=1*QL	1.9	0.83	11	0.50
(fat,kidney) N=20	fat contetn	%		34	37	54	12
	PCDDs	pgTEQ/g	ND=0*QL	1.4	1.2	2.7	0.47
			ND=1/2*QL	1.4	1.2	2.8	0.47
			ND=1*QL	1.4	1.2	2.8	0.48
	PCDFs	pgTEQ/g	ND=0*QL	1.2	1.1	2.3	0.49
			ND=1/2*QL	1.2	1.1	2.3	0.49
			ND=1*QL	1.2	1.1	2.3	0.50
	PCDDs+PCDFs	pgTEQ/g	ND=0*QL	2.6	2.3	4.9	0.99
			ND=1/2*QL	2.6	2.3	4.9	1.0
			ND=1*QL	2.6	2.3	4.9	1.0
	Coplanar PCBs	pgTEQ/g	ND=0*QL	2.7	2.3	5.5	0.98
			ND=1/2*QL	2.7	2.3	5.5	0.98
			ND=1*QL	2.7	2.3	5.5	0.98
	PCDDs+PCDFs+Co-PCBs	pgTEQ/g	ND=0*QL	5.3	4.8	10	2.0
			ND=1/2*QL	5.3	4.8	10	2.0
			ND=1*QL	5.3	4.8	10	2.0

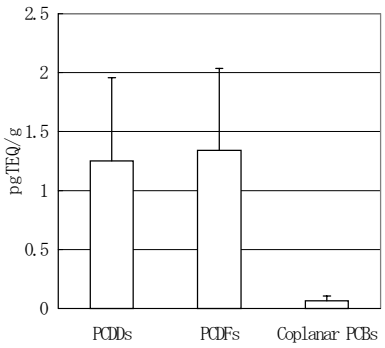
*Note ND=0*QL : calculated applying 0 as the concentration for the isomers below the detection limit
ND=1/2*QL : calculated applying 1/2 value of the detection limit as the concentration for the isomers below the detection limit.
ND=1*QL : calculated applying the value of the detection limit as the concentration for the isomers below the detection limit.

State of Dioxin Accumulation in Wildlife (FY. 1998)
(TEQ by wet weight)

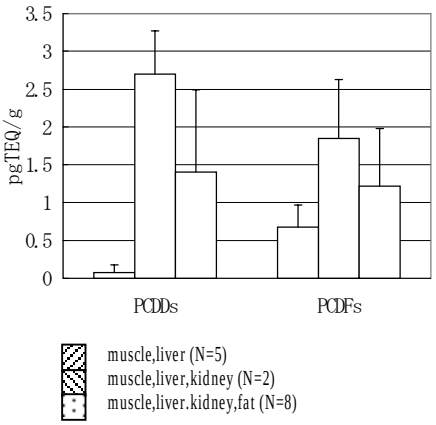
Carp



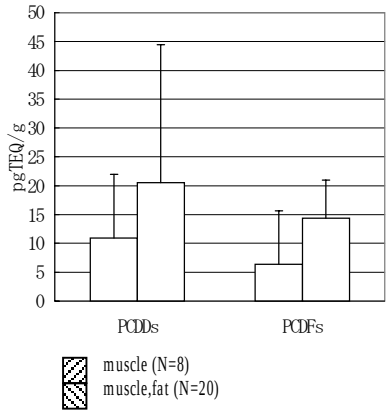
Frogs



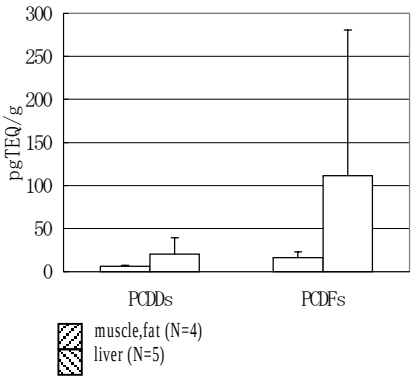
Domestic Pigeon



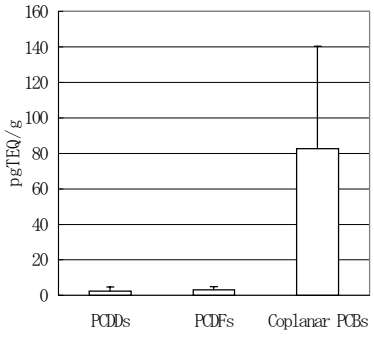
Kite



Raptors



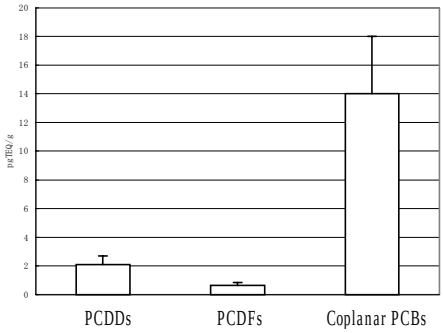
Whales



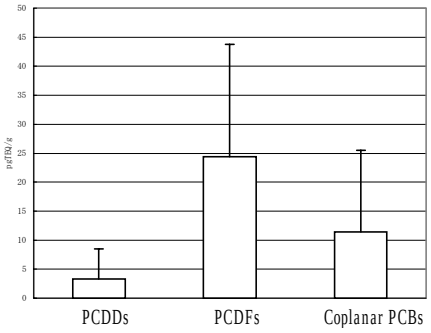
(mean+s. d.)

State of Dioxin Accumulation in Wildlife (FY. 1998)
(TEQ by wet weight)

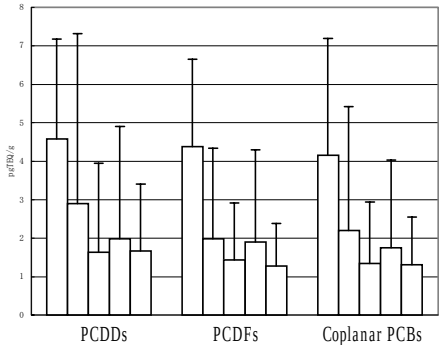
Seals



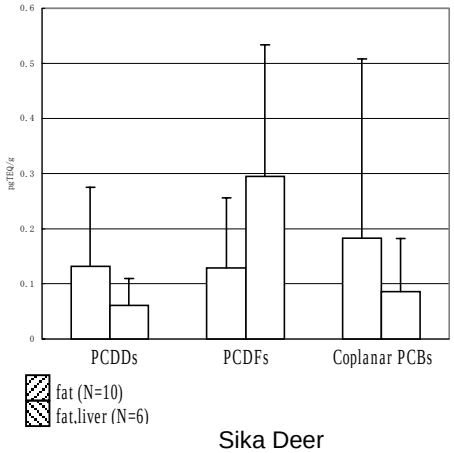
Wood Mouse



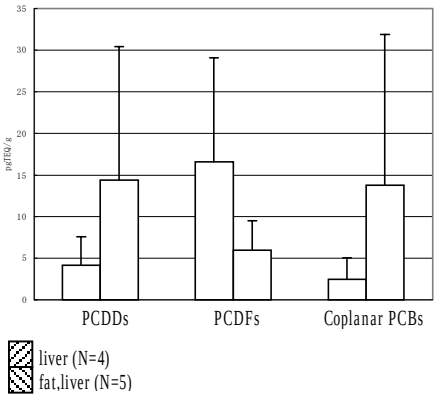
Japanese Macaque



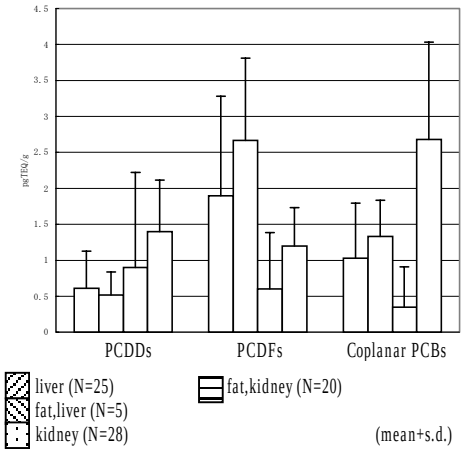
Bears



Raccoon Dogs



Sika Deer



V. Findings of the Survey of the State of Accumulation of Brominated Dioxins in Foods

Overview of Findings

A survey of foods was implemented in fiscal 1997 and 1998 by the collection of food samples obtained using the duplicate method (in which a study subject prepares an identical extra serving of a meal and provides it for the purposes of the study). A total of 48 samples were experimentally measured for brominated dioxins as well as for chlorinated dioxins (hereafter dioxins) for reference purposes.

The results were as follows:

Brominated dioxins were at levels below the lower limit of determination in all samples analyzed.

The mean total daily intake of dioxins in fiscal 1997 was 0.81 pg-TEQ/kg body weight, the median 0.42 pg-TEQ/kg body weight, and the range 0.015–4.8 pg-TEQ/kg body weight. In fiscal 1998, the mean was 0.93 pg-TEQ/kg body weight, the median 0.78 pg-TEQ/kg body weight, and the range 0.0070–3.6 pg-TEQ/kg body weight. Combining fiscal 1997 and 1998, the mean was 0.88 pg-TEQ/kg body weight, the median 0.65 pg-TEQ/kg body weight, and the range 0.0070–4.8 pg-TEQ/kg body weight.

1. Background

Recent studies suggest that, on the average, food is the pathway for over 90% of human exposure to dioxins. On the other hand, almost nothing is known about the state of human exposure to brominated dioxins, which are suspected of having toxicity similar to (chlorinated) dioxins.

Accordingly, an experimental attempt was made in fiscal 1997 and 1998, with the cooperation of local governments, to measure brominated dioxins and other substances in food samples obtained by the duplicate method.

The opinions of the specialists identified in Attachment 1 were solicited in the process of finalizing the findings of this survey.

2. Background

(1) Overview

The level of brominated dioxins was experimentally measured in a total of 48 samples of food collected in fiscal 1997 and 1998 (22 samples in fiscal 1997 and 26 samples in fiscal 1998).

Research into the state of dioxin intake was also conducted in conjunction with this survey.

(2) Test Samples

The survey used food samples that were collected by the duplicate method with the cooperation of local governments in fiscal 1997 and 1998.

The samples are of all the foods taken by mouth by the same subjects at the morning, mid-day, and evening meals, and they were collected using the duplicate method. Upon collection, the foods were combined and homogenized using mixers, with three days' worth of food for a single household being taken as a single sample.

(3) Substances Analyzed

(a) Brominated Dioxins (PBDDs and PBDFs)

-4 brominated compounds: 2 compounds

-5 brominated compounds: 3 compounds

-6 brominated compounds: 3 compounds

(b) Dioxins (See Table 1)

-PCDDs and PCDFs: 28 compounds

-Co-planar PCBs: 12 compounds

(4) Evaluation Method

The results from analyses of dioxins under all items were evaluated together with their toxicity equivalency quantities (TEQs), which were converted using the WHO (1998) toxic equivalency factors (TEF). Dioxin levels below the lower limit of determination (ND) were assigned a zero value, and ND was converted to values equivalent to half of the lower limit of determination and included separately for reference.

The lower limits of determination were as follows:

(a) Brominated Dioxins (PBDDs and PBDFs)

-4 brominated compounds: 0.1 pg/g

-5 brominated compounds: 0.5 pg/g

-6 brominated compounds: 5 pg/g

(b) Dioxins

-4,5 chlorinated compounds: 0.01 pg/g

-6,7 chlorinated compounds: 0.02 pg/g

-8 chlorinated compounds: 0.05 pg/g

-Non-ortho PCBs: 0.1 pg/g

-Mono-ortho PCBs: 1 pg/g

3. Findings

The results of analysis are as shown in Table 2 (brominated dioxins) and Table 3 (dioxins). These results are summarized as follows:

(1) Brominated Dioxins

All isomers analyzed were at levels below the lower limit of determination.

(2) Dioxins

(Figures in brackets are ND levels converted to half of the lower limit of determination.)

The results of conversion to toxicity equivalency quantities (TEQs) show that the total daily quantity of dioxins taken in during fiscal 1997 (total of 22 samples) had a mean value of 0.81 (1.6) pg-TEQ/kg body weight, a median value of 0.42 (1.4) pg-TEQ/kg body weight, and a range of 0.015–4.8 (0.94–5.4) pg-TEQ/kg body weight.

In fiscal 1998 (total of 26 samples), the mean value was 0.93 (1.7) pg-TEQ/kg body weight, a median value of 0.78 (1.4) pg-TEQ/kg body weight, and the range was 0.0070–3.6 (0.88–4.0) pg-TEQ/kg body weight.

Combining the values for fiscal 1997 and 1998 (total of 48 samples), the mean value was 0.88 (1.7) pg-TEQ/kg body weight, the median value was 0.65 (1.4) pg-TEQ/kg body weight, and the range was 0.0070–4.8 (0.88–5.4) pg-TEQ/kg body weight.

This survey did not show any significant differences between fiscal 1997 and 1998.

In addition, 32 (9) out of the total of 48 samples showed levels of 1 pg-TEQ/kg body weight or lower, 12 (29) samples showed levels of 1–2 pg-TEQ/kg body weight, 2 (8) samples showed levels of 2–3 pg-TEQ/kg body weight, 1 (1) sample showed a level of 3–4 pg-TEQ/kg body weight, and 1 (1) showed a level above 4 pg-TEQ/kg body weight.

4. Conclusions and Evaluation

This survey used samples of food collected using the duplicate method in fiscal 1997 and 1998 in an attempt to determine the actual status of intake of brominated dioxins and other compounds.

The results of analysis of brominated dioxins showed that all isomers were at levels below the lower limit of determination. However, the analysis of brominated dioxins is still at an experimental stage, and it is considered necessary to improve the lower limits of determination, refine the analytical methods, and make other

improvements.

As analytical methods continue to be improved, it will be essential in the future to determine and monitor the levels of these chemicals not only in foods but also in the air and other environmental media.

This survey also concurrently examined the state of dioxin intake, and the results obtained show that the mean value in fiscal 1997 was 0.81 (1.6) pg-TEQ/kg body weight, while in fiscal 1998 it was 0.93 (1.7) pg-TEQ/kg body weight, and the combined mean value for both years was 0.88 (1.7) pg-TEQ/kg body weight. The survey did not show any significant differences between fiscal 1997 and fiscal 1998.

The present survey provided only a one-time longitudinal study for the three-day period when the food samples fromeach household were counted as one sample. It is not possible to make simple comparisons between these results and the tolerable daily intake (TDI, 4 pg-TEQ/kg body weight/day), which is an indicator geared to the effects of continuous lifetime intake. Furthermore, the survey does not account for amounts absorbed from the air and other media. However, only one of the 48 samples exceeded the level of 4 pg-TEQ/kg body weight (4.8 pg-TEQ/kg body weight when values below the lower limit of determination were treated as zero). Unless it is conducted continuously over a somewhat longer period, a longitudinal survey like this one presents difficulties for evaluation of the mean level of intake from food by individual human beings. Consequently, if the cooperation of persons involved in the study could be ensured, it would be desirable to design ongoing surveys in order to study the same households over a longer period of time.

5. Future Plans

Starting in the next fiscal year, improvements will be made to methods for analyzing brominated dioxins while the work continues with collecting and organizing knowledge relating to the toxicity and state of exposure of these compounds (document surveys). Plans also call for the simultaneous implementation of pilot surveys to determine the actual status of brominated dioxin concentrations in environmental media.

In relation to dioxins, the findings of the Survey on Long-Term Impact of Exposure to Dioxins in the Air implemented during the last fiscal year will be taken into account in carrying out the Survey of Precise Exposure to Dioxins this fiscal year. This is to include a three-time food survey (duplicate method) of the same subjects who were surveyed last fiscal year. Needless to say, it will hardly be possible to make simple comparisons with the tolerable daily intake (TDI, 4 pg-TEQ/kg body weight/day) on the basis of a three- to four-time survey (the

subjects to be surveyed as a continuation from last fiscal year's study will have been surveyed four times, including last year). However, this should make it possible to obtain a clearer view of the variations between individual subjects with respect to each food surved.

List of members (omitted)

Isomers Measured Table 1

	No. of Chlorines	Isomers	TEF	
			I-TEF(1988) WHO/IPCS-TEF(1993)※	WHO-TEF1998
PCDDs	4	1,3,6,8-T_4 CDD	—	—
		1,3,7,9-T_4 CDD	—	—
		2,3,7,8-T_4 CDD	1	1
	5	1,2,3,7,8-P_5 CDD	0.5	1
	6	1,2,3,4,7,8-H_6 CDD	0.1	0.1
		1,2,3,6,7,8-H_6 CDD	0.1	0.1
		1,2,3,7,8,9-H_6 CDD	0.1	0.1
	7	1,2,3,4,6,7,8-H_7 CDD	0.01	0.01
	8	1,2,3,4,6,7,8,9-O_8 CDD	0.001	0.0001
PCDFs	4	1,2,7,8-T_4 CDF	—	—
		2,3,7,8-T_4 CDF	0.1	0.1
	5	1,2,3,7,8-P_5 CDF	0.05	0.05
		2,3,4,7,8-P_5 CDF	0.5	0.5
	6	1,2,3,4,7,8-H_6 CDF	0.1	0.1
		1,2,3,6,7,8-H_6 CDF	0.1	0.1
		1,2,3,7,8,9-H_6 CDF	0.1	0.1
		2,3,4,6,7,8-H_6 CDF	0.1	0.1
	7	1,2,3,4,6,7,8-H_7 CDF	0.01	0.01
		1,2,3,4,7,8,9-H_7 CDF	0.01	0.01
	8	1,2,3,4,6,7,8,9-O_8 CDF	0.001	0.0001
Coplanaer PCB	Non-ortho	3,4,4',5-T_4 CB	—	0.0001
		3,3',4,4'-T_4 CB	0.0005	0.0001
		3,3',4,4',5-P_5 CB	0.1	0.1
		3,3',4,4',5,5'-H_6 CB	0.01	0.01
	Mono-ortho	2',3,4,4',5-P_5 CB	0.0001	0.0001
		2,3',4,4',5-P_5 CB	0.0001	0.0001
		2,3,3',4,4'-P_5 CB	0.0001	0.0001
		2,3,4,4',5-P_5 CB	0.0005	.0005
		2,3',4,4',5,5'-H_6 CB	0.00001	0.00001
		2,3,3',4,4',5-H_6 CB	0.0005	0.0005
		2,3,3',4,4',5'-H_6 CB	0.0005	0.0005
		2,3,3',4,4',5,5'-H_7 CB	0.0001	0.0001
	Di-ortho	2,2',3,4,4',5,5'-H_7 CB	0.00001	—
		2,2',3,3',4,4',5-H_7 CB	0.0001	—

※ PCDDs and PCDFs: I-TEF(1988). Coplanar PCB: WHO/ICPS-TEF(1993)

Individual Measurement （Polybrominated dioxins） Table 2

Isomers analyzed pg/g	1	2	3	4	5	6
2,3,7,8-T4BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDD/1,2,3,6,7,8-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,7,8-T4BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

N.D.: Under the lower limit of detection. For 4BR-compounds: 0.1pg/g. 5BRs:0.5pg/g. 6BRs:5pg/g.

Isomers analyzed pg/g	7	8	9	10	11	12
2,3,7,8-T4BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDD/1,2,3,6,7,8-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,7,8-T4BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

N.D.: Under the lower limit of detection. For 4BR-compounds: 0.1pg/g. 5BRs:0.5pg/g. 6BRs:5pg/g.

Isomers analyzed pg/g	13	14	15	16	17	18
2,3,7,8-T4BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDD/1,2,3,6,7,8-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,7,8-T4BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

N.D.: Under the lower limit of detection. For 4BR-compounds: 0.1pg/g. 5BRs:0.5pg/g. 6BRs:5pg/g.

Isomers analyzed pg/g	19	20	21	22	23	24
2,3,7,8-T4BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDD/1,2,3,6,7,8-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,7,8-T4BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

N.D.: Under the lower limit of detection. For 4BR-compounds: 0.1pg/g. 5BRs:0.5pg/g. 6BRs:5pg/g.

Isomers analyzed pg/g	25	26	27	28	29	30
2,3,7,8-T4BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDD/1,2,3,6,7,8-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,7,8-T4BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

N.D.: Under the lower limit of detection. For 4BR-compounds: 0.1pg/g. 5BRs:0.5pg/g. 6BRs:5pg/g.

Isomers analyzed pg/g	31	32	33	34	35	36
2,3,7,8-T4BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDD/1,2,3,6,7,8-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,7,8-T4BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

N.D.: Under the lower limit of detection. For 4BR-compounds: 0.1pg/g. 5BRs:0.5pg/g. 6BRs:5pg/g.

Isomers analyzed pg/g	37	38	39	40	41	42
2,3,7,8-T4BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDD/1,2,3,6,7,8-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,7,8-T4BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

N.D.: Under the lower limit of detection. For 4BR-compounds: 0.1pg/g. 5BRs:0.5pg/g. 6BRs:5pg/g.

Isomers analyzed pg/g	43	44	45	46	47	48
2,3,7,8-T4BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDD/1,2,3,6,7,8-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6BrDD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,7,8-T4BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,7,8-P5BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6BrDF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

N.D.: Under the lower limit of detection. For 4BR-compounds: 0.1pg/g. 5BRs:0.5pg/g. 6BRs:5pg/g.

Individual Measurement （dioxins） Table 3

Isomers Analyszed pg/g	WHO-TEF (1998)	1	2	3	4	5	6	7
2,3,7,8-T4CDD	1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,3,6,8-T4CDD	-	0.06	0.09	0.58	0.05	0.18	0.17	0.05
1,3,7,9-T4CDD	-	0.01	0.02	0.12	0.01	0.02	0.04	0.01
Other T4CDDs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5CDD	1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other P5CDDs	-	N.D.	0.01	0.05	N.D.	0.02	0.03	N.D.
1,2,3,4,7,8-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,6,7,8-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other H6CDDs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,6,7,8-H7CDD	0.01	0.02	N.D.	0.02	0.06	0.03	0.02	N.D.
Other H7CDD	-	N.D.	N.D.	N.D.	N.D.	0.03	N.D.	N.D.
O8CDD	0.0001	0.09	0.08	0.09	0.2	0.22	0.13	0.08
2,3,7,8-T4CDF	0.1	N.D.	N.D.	0.01	0.01	0.01	0.01	N.D.
1,3,6,8-T4CDF	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other T4CDFs	-	0.01	N.D.	0.02	N.D.	0.03	N.D.	N.D.
1,2,3,7,8-P5CDF	0.05	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,7,8-P5CDF	0.5	N.D.	N.D.	N.D.	0.01	N.D.	0.01	N.D.
Other P5CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	0.01	N.D.
1,2,3,4,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,6,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,6,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
OtherH6CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,6,7,8-H7CDF	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8,9-H7CDF	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other H7CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
O8CDF	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
TEQ(Total PCDDs)	-	0.00021	0.0000080	0.00021	0.00062	0.00032	0.00021	0.0000080
TEQ(Total PCDFs)	-	0	0	0.0010	0.0060	0.0010	0.0060	0
TEQ(Total PCDD/Fs)	-	0.00021	0.0000080	0.0012	0.0066	0.0013	0.0062	0.0000080
3,4,4',5-T4CB(#81)	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
3,3',4,4'-T4CB(#77)	0.0001	0.3	0.1	0.4	0.2	0.5	0.3	N.D.
3,3',4,4',5-P5CB(#126)	0.1	N.D.	N.D.	0.2	0.1	0.3	0.2	N.D.
3,3',4,4',5,5'-H6CB(#169)	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2',3,4,4',5-P5CB(#123)	0.0001	N.D.	N.D.	2	N.D.	5	N.D.	N.D.
2,3',4,4',5-P5CB(#118)	0.0001	9	6	35	11	86	14	3
2,3,4,4',5-P5CB(#114)	0.0005	N.D.	N.D.	N.D.	N.D.	1	N.D.	N.D.
2,3,3',4,4'-P5CB(#105)	0.0001	3	2	9	4	23	4	N.D.
2,3',4,4',5,5'-H6CB(#167)	0.00001	1	N.D.	5	N.D.	11	4	N.D.
2,3,3',4,4',5-H6CB(#156)	0.0005	N.D.	N.D.	7	1	12	2	N.D.
2,3,3',4,4',5'-H6CB(#157)	0.0005	N.D.	N.D.	1	N.D.	2	N.D.	N.D.
2,3,3',4,4',5,5'-H7CB(#189)	0.0001	N.D.	N.D.	1	N.D.	2	N.D.	N.D.
TEQ(Non-ortho PCBs)	-	0.00003	0.000010	0.020	0.010	0.030	0.020	0
TEQ(Mono-ortho PCBs)	-	0.0012	0.00080	0.0088	0.0020	0.019	0.0028	0.00030
TEQ(Total Co-PCBs)	-	0.0012	0.00081	0.029	0.012	0.049	0.023	0.00030
TEQ(Total dioxins)	-	0.0014	0.00082	0.030	0.019	0.050	0.029	0.00031

N.D.: Under the lower limit of detection. For 4,5-substitutes: 0.01pg/g. 6,7-s:0.02pg/g. 8-s:0.05pg/g.

For Non-orthos:0.1pg/g. Mono-orthos:1pg/g.

Individual Measurement （dioxins）

Isomers Analyszed pg/g	WHO-TEF (1998)	8	9	10	11	12	13	14
2,3,7,8-T4CDD	1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,3,6,8-T4CDD	-	0.09	0.14	0.16	0.04	0.32	0.05	0.5
1,3,7,9-T4CDD	-	0.02	0.03	0.03	0.01	0.06	0.01	0.06
Other T4CDDs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5CDD	1	N.D.	N.D.	0.02	N.D.	0.02	N.D.	N.D.
Other P5CDDs	-	0.01	0.03	0.01	N.D.	0.02	N.D.	0.04
1,2,3,4,7,8-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,6,7,8-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other H6CDDs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,6,7,8-H7CDD	0.01	0.05	0.02	0.03	N.D.	0.03	0.04	0.02
Other H7CDD	-	N.D.	0.02	N.D.	N.D.	0.02	N.D.	N.D.
O8CDD	0.0001	0.25	0.12	0.11	0.07	0.22	0.2	0.09
2,3,7,8-T4CDF	0.1	N.D.	0.03	0.03	N.D.	0.03	0.01	N.D.
1,3,6,8-T4CDF	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other T4CDFs	-	N.D.	0.04	0.01	N.D.	0.01	N.D.	0.02
1,2,3,7,8-P5CDF	0.05	N.D.	N.D.	0.01	N.D.	0.02	N.D.	N.D.
2,3,4,7,8-P5CDF	0.5	N.D.	0.01	0.04	N.D.	0.04	0.01	N.D.
Other P5CDFs	-	N.D.	0.02	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,6,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,6,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	0.02	N.D.	N.D.
OtherH6CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,6,7,8-H7CDF	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8,9-H7CDF	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other H7CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
O8CDF	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
TEQ(Total PCDDs)	-	0.00053	0.00021	0.020	0.0000070	0.020	0.00042	0.00021
TEQ(Total PCDFs)	-	0	0.0080	0.024	0	0.026	0.0060	0
TEQ(Total PCDD/Fs)	-	0.00053	0.0082	0.044	0.0000070	0.046	0.0064	0.00021
3,4,4',5-T4CB(#81)	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
3,3',4,4'-T4CB(#77)	0.0001	0.2	0.5	0.8	N.D.	0.8	0.3	0.1
3,3',4,4',5-P5CB(#126)	0.1	0.1	0.2	0.4	N.D.	0.7	0.2	N.D.
3,3',4,4',5,5'-H6CB(#169)	0.01	N.D.	N.D.	0.1	N.D.	0.2	N.D.	N.D.
2',3,4,4',5-P5CB(#123)	0.0001	N.D.	N.D.	2	N.D.	3	1	N.D.
2,3',4,4',5-P5CB(#118)	0.0001	20	21	47	3	84	42	4
2,3,4,4',5-P5CB(#114)	0.0005	N.D.	N.D.	N.D.	N.D.	2	N.D.	N.D.
2,3,3',4,4'-P5CB(#105)	0.0001	5	6	15	1	23	14	1
2,3',4,4',5,5'-H6CB(#167)	0.00001	3	2	10	N.D.	9	10	N.D.
2,3,3',4,4',5-H6CB(#156)	0.0005	2	2	5	N.D.	9	4	N.D.
2,3,3',4,4',5'-H6CB(#157)	0.0005	N.D.	N.D.	1	N.D.	3	1	N.D.
2,3,3',4,4',5,5'-H7CB(#189)	0.0001	N.D.	N.D.	N.D.	N.D.	1	N.D.	N.D.
TEQ(Non-ortho PCBs)	-	0.010	0.020	0.041	0	0.072	0.020	0.000010
TEQ(Mono-ortho PCBs)	-	0.0035	0.0037	0.0095	0.00040	0.018	0.0083	0.00050
TEQ(Total Co-PCBs)	-	0.014	0.024	0.051	0.00040	0.090	0.028	0.00051
TEQ(Total dioxins)	-	0.0014	0.00082	0.030	0.019	0.050	0.029	0.00031

N.D.: Under the lower limit of detection. For 4,5-substitutes: 0.01pg/g. 6,7-s:0.02pg/g. 8-s:0.05pg/g.

For Non-orthos:0.1pg/g. Mono-orthos:1pg/g.

Individual Measurement （dioxins）

Isomers Analyszed pg/g	WHO-TEF (1998)	15	16	17	18	19	20	21
2,3,7,8-T4CDD	1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,3,6,8-T4CDD	-	0.08	0.26	0.5	0.46	0.1	0.16	0.51
1,3,7,9-T4CDD	-	0.03	0.06	0.08	0.17	0.02	0.02	0.11
Other T4CDDs	-	N.D.	N.D.	N.D.	0.2	N.D.	N.D.	0.01
1,2,3,7,8-P5CDD	1	N.D.	N.D.	0.01	0.02	N.D.	N.D.	N.D.
Other P5CDDs	-	0.02	0.08	0.05	0.25	0.02	0.02	0.04
1,2,3,4,7,8-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,6,7,8-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other H6CDDs	-	0.03	0.03	N.D.	0.17	0.03	N.D.	N.D.
1,2,3,4,6,7,8-H7CDD	0.01	0.03	0.06	0.08	0.09	0.04	0.04	0.02
Other H7CDD	-	0.02	0.03	0.04	0.08	0.03	0.02	N.D.
O8CDD	0.0001	0.11	0.3	0.6	0.36	0.23	0.15	0.1
2,3,7,8-T4CDF	0.1	0.03	0.02	0.01	0.05	0.02	N.D.	N.D.
1,3,6,8-T4CDF	-	N.D.	0.01	N.D.	0.06	N.D.	N.D.	N.D.
Other T4CDFs	-	N.D.	0.31	0.02	1.7	0.03	N.D.	0.02
1,2,3,7,8-P5CDF	0.05	0.01	N.D.	N.D.	0.04	N.D.	N.D.	N.D.
2,3,4,7,8-P5CDF	0.5	0.01	0.01	0.02	0.05	0.01	N.D.	N.D.
Other P5CDFs	-	0.01	0.02	N.D.	0.62	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	0.04	N.D.	N.D.	N.D.
1,2,3,6,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	0.03	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,6,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	0.06	N.D.	N.D.	N.D.
OtherH6CDFs	-	N.D.	N.D.	N.D.	0.21	N.D.	N.D.	N.D.
1,2,3,4,6,7,8-H7CDF	0.01	N.D.	0.02	0.03	0.1	N.D.	N.D.	N.D.
1,2,3,4,7,8,9-H7CDF	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other H7CDFs	-	N.D.	N.D.	N.D.	0.05	N.D.	N.D.	N.D.
O8CDF	0.0001	N.D.	N.D.	N.D.	0.06	N.D.	N.D.	N.D.
TEQ(Total PCDDs)	-	0.00031	0.00063	0.011	0.021	0.00042	0.00042	0.00021
TEQ(Total PCDFs)	-	0.0085	0.0072	0.011	0.046	0.0070	0	0
TEQ(Total PCDD/Fs)	-	0.0088	0.0078	0.022	0.067	0.0074	0.00042	0.00021
3,4,4',5-T4CB(#81)	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
3,3',4,4'-T4CB(#77)	0.0001	1	0.5	0.3	1	0.4	0.1	0.3
3,3',4,4',5-P5CB(#126)	0.1	0.2	0.1	0.1	0.2	0.2	N.D.	0.1
3,3',4,4',5,5'-H6CB(#169)	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2',3,4,4',5-P5CB(#123)	0.0001	2	N.D.	N.D.	N.D.	1	N.D.	N.D.
2,3',4,4',5-P5CB(#118)	0.0001	28	11	15	11	37	5	9
2,3,4,4',5-P5CB(#114)	0.0005	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,3',4,4'-P5CB(#105)	0.0001	7	3	4	3	11	1	3
2,3',4,4',5,5'-H6CB(#167)	0.00001	6	2	3	2	10	1	2
2,3,3',4,4',5-H6CB(#156)	0.0005	3	N.D.	1	1	4	N.D.	1
2,3,3',4,4',5'-H6CB(#157)	0.0005	N.D.	N.D.	N.D.	N.D.	1	N.D.	N.D.
2,3,3',4,4',5,5'-H7CB(#189)	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
TEQ(Non-ortho PCBs)	-	0.020	0.010	0.010	0.020	0.020	0.000010	0.010
TEQ(Mono-ortho PCBs)	-	0.0053	0.0014	0.0024	0.0019	0.0075	0.00061	0.0017
TEQ(Total Co-PCBs)	-	0.025	0.011	0.012	0.022	0.028	0.00062	0.012
TEQ(Total dioxins)	-	0.034	0.019	0.034	0.089	0.035	0.0010	0.012

N.D.: Under the lower limit of detection. For 4,5-substitutes: 0.01pg/g. 6,7-s:0.02pg/g. 8-s:0.05pg/g.

For Non-orthos:0.1pg/g. Mono-orthos:1pg/g.

Individual Measurement （dioxins）

Isomers Analyszed pg/g	WHO-TEF (1998)	22	23	24	25	26	27	28
2,3,7,8-T4CDD	1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,3,6,8-T4CDD	-	0.29	0.5	3.1	0.13	0.18	0.33	0.2
1,3,7,9-T4CDD	-	0.06	0.12	0.64	0.02	0.03	0.06	0.05
Other T4CDDs	-	N.D.	N.D.	0.07	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5CDD	1	N.D.	0.02	N.D.	N.D.	N.D.	N.D.	N.D.
Other P5CDDs	-	0.03	0.05	0.31	0.02	0.04	0.03	0.04
1,2,3,4,7,8-H6CDD	0.1	N.D.	0.03	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,6,7,8-H6CDD	0.1	N.D.	0.05	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other H6CDDs	-	N.D.	0.03	0.12	N.D.	0.06	N.D.	0.03
1,2,3,4,6,7,8-H7CDD	0.01	0.08	0.3	0.05	0.03	0.04	0.05	0.03
Other H7CDD	-	N.D.	0.04	0.06	N.D.	0.03	0.02	0.03
O8CDD	0.0001	0.36	1.2	0.31	0.15	0.19	0.28	0.2
2,3,7,8-T4CDF	0.1	N.D.	N.D.	0.02	0.02	0.02	0.02	0.02
1,3,6,8-T4CDF	-	N.D.	N.D.	0.01	N.D.	N.D.	N.D.	0.01
Other T4CDFs	-	0.02	0.03	0.21	N.D.	0.07	0.03	0.17
1,2,3,7,8-P5CDF	0.05	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,7,8-P5CDF	0.5	N.D.	0.03	0.01	0.01	0.01	0.02	0.01
Other P5CDFs	-	N.D.	N.D.	0.05	N.D.	0.03	0.02	0.02
1,2,3,4,7,8-H6CDF	0.1	N.D.	0.04	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,6,7,8-H6CDF	0.1	N.D.	0.04	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,6,7,8-H6CDF	0.1	N.D.	0.04	N.D.	N.D.	N.D.	N.D.	N.D.
OtherH6CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,6,7,8-H7CDF	0.01	0.02	0.1	N.D.	N.D.	0.02	N.D.	N.D.
1,2,3,4,7,8,9-H7CDF	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other H7CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
O8CDF	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
TEQ(Total PCDDs)	-	0.00084	0.031	0.00053	0.00032	0.00042	0.00053	0.00032
TEQ(Total PCDFs)	-	0.00020	0.028	0.0070	0.0070	0.0072	0.012	0.0070
TEQ(Total PCDD/Fs)	-	0.0010	0.059	0.0075	0.0073	0.0076	0.013	0.0073
3,4,4',5-T4CB(#81)	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
3,3',4,4'-T4CB(#77)	0.0001	0.1	0.1	0.2	0.5	0.2	0.6	0.6
3,3',4,4',5-P5CB(#126)	0.1	N.D.	0.2	0.1	0.2	N.D.	0.3	0.1
3,3',4,4',5,5'-H6CB(#169)	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2',3,4,4',5-P5CB(#123)	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	1	N.D.
2,3',4,4',5-P5CB(#118)	0.0001	4	8	14	15	9	31	14
2,3,4,4',5-P5CB(#114)	0.0005	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,3',4,4'-P5CB(#105)	0.0001	1	2	4	5	3	10	4
2,3',4,4',5,5'-H6CB(#167)	0.00001	N.D.	2	2	3	2	7	3
2,3,3',4,4',5-H6CB(#156)	0.0005	N.D.	1	1	2	N.D.	3	1
2,3,3',4,4',5'-H6CB(#157)	0.0005	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,3',4,4',5,5'-H7CB(#189)	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
TEQ(Non-ortho PCBs)	-	0.000010	0.020	0.010	0.020	0.000020	0.030	0.010
TEQ(Mono-ortho PCBs)	-	0.00050	0.0015	0.0023	0.0030	0.0012	0.0058	0.0023
TEQ(Total Co-PCBs)	-	0.00051	0.022	0.012	0.023	0.0012	0.036	0.012
TEQ(Total dioxins)	-	0.0015	0.081	0.020	0.030	0.0088	0.049	0.019

N.D.: Under the lower limit of detection. For 4,5-substitutes: 0.01pg/g. 6,7-s:0.02pg/g. 8-s:0.05pg/g.
For Non-orthos:0.1pg/g. Mono-orthos:1pg/g.

Individual Measurement （dioxins）

Isomers Analyszed pg/g	WHO-TEF (1998)	29	30	31	32	33	34	35
2,3,7,8-T4CDD	1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,3,6,8-T4CDD	-	0.09	0.06	0.12	0.07	0.22	0.15	0.05
1,3,7,9-T4CDD	-	0.03	0.01	0.02	0.01	0.04	0.04	0.01
Other T4CDDs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8-P5CDD	1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other P5CDDs	-	0.01	N.D.	N.D.	N.D.	0.01	0.01	N.D.
1,2,3,4,7,8-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,6,7,8-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other H6CDDs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,6,7,8-H7CDD	0.01	N.D.	0.02	0.03	0.03	N.D.	0.03	0.02
Other H7CDD	-	N.D.	0.02	0.02	N.D.	N.D.	0.03	0.03
O8CDD	0.0001	0.15	0.24	0.24	0.17	0.09	0.21	0.27
2,3,7,8-T4CDF	0.1	N.D.	0.02	0.01	0.02	N.D.	0.01	0.02
1,3,6,8-T4CDF	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other T4CDFs	-	N.D.	N.D.	0.03	N.D.	0.01	0.02	0.04
1,2,3,7,8-P5CDF	0.05	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,7,8-P5CDF	0.5	N.D.	0.01	N.D.	N.D.	N.D.	N.D.	0.02
Other P5CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,6,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,6,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
OtherH6CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,6,7,8-H7CDF	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8,9-H7CDF	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other H7CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
O8CDF	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
TEQ(Total PCDDs)	-	0.000015	0.00022	0.00032	0.00032	0.0000090	0.00032	0.00023
TEQ(Total PCDFs)	-	0	0.0070	0.0010	0.0020	0	0.0010	0.012
TEQ(Total PCDD/Fs)	-	0.000015	0.0072	0.0013	0.0023	0.0000090	0.0013	0.012
3,4,4',5-T4CB(#81)	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
3,3',4,4'-T4CB(#77)	0.0001	0.4	0.8	0.2	0.6	0.3	0.3	0.8
3,3',4,4',5-P5CB(#126)	0.1	N.D.	0.3	N.D.	0.1	N.D.	0.1	0.3
3,3',4,4',5,5'-H6CB(#169)	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2',3,4,4',5-P5CB(#123)	0.0001	N.D.	N.D.	N.D.	1	1	1	1
2,3',4,4',5-P5CB(#118)	0.0001	6	7	10	26	20	16	22
2,3,4,4',5-P5CB(#114)	0.0005	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,3',4,4'-P5CB(#105)	0.0001	2	2	3	7	8	4	7
2,3',4,4',5,5'-H6CB(#167)	0.00001	1	N.D.	1	6	3	2	5
2,3,3',4,4',5-H6CB(#156)	0.0005	N.D.	N.D.	1	2	3	2	2
2,3,3',4,4',5'-H6CB(#157)	0.0005	N.D.	N.D.	N.D.	N.D.	1	N.D.	N.D.
2,3,3',4,4',5,5'-H7CB(#189)	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
TEQ(Non-ortho PCBs)	-	0.000040	0.030	0.000020	0.010	0.000030	0.010	0.030
TEQ(Mono-ortho PCBs)	-	0.00081	0.00090	0.0018	0.0045	0.0049	0.0031	0.0041
TEQ(Total Co-PCBs)	-	0.00085	0.031	0.0018	0.015	0.0049	0.013	0.034
TEQ(Total dioxins)	-	0.00088	0.038	0.0031	0.017	0.0050	0.014	0.046

N.D.: Under the lower limit of detection. For 4,5-substitutes: 0.01pg/g. 6,7-s:0.02pg/g. 8-s:0.05pg/g.
For Non-orthos:0.1pg/g. Mono-orthos:1pg/g.

Individual Measurement （dioxins）

Isomers Analyszed pg/g	WHO-TEF (1998)	36	37	38	39	40	41	42
2,3,7,8-T4CDD	1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,3,6,8-T4CDD	-	0.05	0.07	0.17	0.06	0.12	0.05	1.9
1,3,7,9-T4CDD	-	0.02	0.01	0.04	0.02	0.04	0.02	0.33
Other T4CDDs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.03
1,2,3,7,8-P5CDD	1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other P5CDDs	-	N.D.	N.D.	0.03	N.D.	0.01	0.01	0.14
1,2,3,4,7,8-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,6,7,8-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other H6CDDs	-	N.D.	0.02	0.03	N.D.	0.02	N.D.	0.02
1,2,3,4,6,7,8-H7CDD	0.01	0.04	0.04	0.03	N.D.	0.04	N.D.	0.05
Other H7CDD	-	0.03	0.02	0.03	N.D.	0.04	N.D.	0.03
O8CDD	0.0001	0.72	0.37	0.2	0.18	0.35	0.07	0.39
2,3,7,8-T4CDF	0.1	N.D.	N.D.	0.02	N.D.	N.D.	0.02	0.01
1,3,6,8-T4CDF	-	N.D.	N.D.	0.01	N.D.	N.D.	N.D.	N.D.
Other T4CDFs	-	N.D.	N.D.	0.05	N.D.	N.D.	0.01	0.14
1,2,3,7,8-P5CDF	0.05	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,7,8-P5CDF	0.5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other P5CDFs	-	N.D.	N.D.	0.01	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,6,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,6,7,8-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
OtherH6CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,6,7,8-H7CDF	0.01	N.D.	0.02	N.D.	N.D.	0.02	N.D.	N.D.
1,2,3,4,7,8,9-H7CDF	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other H7CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
O8CDF	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
TEQ(Total PCDDs)	-	0.00047	0.00044	0.00032	0.000018	0.00044	0.0000070	0.00054
TEQ(Total PCDFs)	-	0	0.00020	0.0020	0	0.00020	0.0020	0.0010
TEQ(Total PCDD/Fs)	-	0.00047	0.00064	0.0023	0.000018	0.00064	0.0020	0.0015
3,4,4',5-T4CB(#81)	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
3,3',4,4'-T4CB(#77)	0.0001	0.1	0.3	0.5	N.D.	0.1	0.5	0.1
3,3',4,4',5-P5CB(#126)	0.1	N.D.	N.D.	0.2	N.D.	N.D.	0.2	N.D.
3,3',4,4',5,5'-H6CB(#169)	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2',3,4,4',5-P5CB(#123)	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3',4,4',5-P5CB(#118)	0.0001	3	7	22	2	5	17	5
2,3,4,4',5-P5CB(#114)	0.0005	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,3',4,4'-P5CB(#105)	0.0001	N.D.	2	8	N.D.	1	5	2
2,3',4,4',5,5'-H6CB(#167)	0.00001	N.D.	1	2	N.D.	1	5	N.D.
2,3,3',4,4',5-H6CB(#156)	0.0005	N.D.	N.D.	2	N.D.	N.D.	2	N.D.
2,3,3',4,4',5'-H6CB(#157)	0.0005	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,3',4,4',5,5'-H7CB(#189)	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
TEQ(Non-ortho PCBs)	-	0.000010	0.000030	0.020	0	0.000010	0.020	0.000010
TEQ(Mono-ortho PCBs)	-	0.00030	0.00091	0.0040	0.00020	0.00061	0.0033	0.00070
TEQ(Total Co-PCBs)	-	0.00031	0.00094	0.024	0.00020	0.00062	0.023	0.00071
TEQ(Total dioxins)	-	0.00078	0.0016	0.026	0.00022	0.0013	0.025	0.0022

N.D.: Under the lower limit of detection. For 4,5-substitutes: 0.01pg/g. 6,7-s:0.02pg/g. 8-s:0.05pg/g.
For Non-orthos:0.1pg/g. Mono-orthos:1pg/g.

Individual Measurement （dioxins）

Isomers Analyszed pg/g	WHO-TEF (1998)	43	44	45	46	47	48
2,3,7,8-T4CDD	1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,3,6,8-T4CDD	-	0.17	0.2	0.6	0.08	0.09	0.23
1,3,7,9-T4CDD	-	0.04	0.04	0.1	0.02	0.02	0.03
Other T4CDDs	-	N.D.	N.D.	0.01	N.D.	N.D.	N.D.
1,2,3,7,8-P5CDD	1	N.D.	0.01	N.D.	0.01	N.D.	N.D.
Other P5CDDs	-	0.01	0.03	0.05	N.D.	0.01	N.D.
1,2,3,4,7,8-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,6,7,8-H6CDD	0.1	N.D.	0.02	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6CDD	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other H6CDDs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,6,7,8-H7CDD	0.01	0.02	0.08	0.05	0.04	0.04	N.D.
Other H7CDD	-	N.D.	0.03	0.02	N.D.	0.03	0.02
O8CDD	0.0001	0.12	0.35	0.19	0.16	0.25	0.13
2,3,7,8-T4CDF	0.1	0.01	0.01	0.01	0.01	0.01	N.D.
1,3,6,8-T4CDF	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other T4CDFs	-	0.04	0.01	0.03	0.01	0.03	0.01
1,2,3,7,8-P5CDF	0.05	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,7,8-P5CDF	0.5	0.01	0.02	0.01	0.02	N.D.	N.D.
Other P5CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8-H6CDF	0.1	N.D.	0.03	N.D.	N.D.	N.D.	N.D.
1,2,3,6,7,8-H6CDF	0.1	N.D.	0.02	N.D.	N.D.	N.D.	N.D.
1,2,3,7,8,9-H6CDF	0.1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,4,6,7,8-H6CDF	0.1	N.D.	0.02	N.D.	N.D.	N.D.	N.D.
OtherH6CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,3,4,6,7,8-H7CDF	0.01	N.D.	0.03	N.D.	N.D.	N.D.	N.D.
1,2,3,4,7,8,9-H7CDF	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Other H7CDFs	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
O8CDF	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
TEQ(Total PCDDs)	-	0.00021	0.013	0.00052	0.010	0.00043	0.000013
TEQ(Total PCDFs)	-	0.0060	0.018	0.0060	0.011	0.0010	0
TEQ(Total PCDD/Fs)	-	0.0062	0.031	0.0065	0.021	0.0014	0.000013
3,4,4',5-T4CB(#81)	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
3,3',4,4'-T4CB(#77)	0.0001	0.3	0.3	0.5	0.2	0.1	0.1
3,3',4,4',5-P5CB(#126)	0.1	0.2	0.2	0.1	0.2	N.D.	N.D.
3,3',4,4',5,5'-H6CB(#169)	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2',3,4,4',5-P5CB(#123)	0.0001	N.D.	N.D.	1	1	N.D.	N.D.
2,3',4,4',5-P5CB(#118)	0.0001	13	18	20	20	3	4
2,3,4,4',5-P5CB(#114)	0.0005	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2,3,3',4,4'-P5CB(#105)	0.0001	4	5	6	7	1	1
2,3',4,4',5,5'-H6CB(#167)	0.00001	2	4	3	3	N.D.	N.D.
2,3,3',4,4',5-H6CB(#156)	0.0005	2	2	2	4	N.D.	N.D.
2,3,3',4,4',5'-H6CB(#157)	0.0005	N.D.	N.D.	N.D.	2	N.D.	N.D.
2,3,3',4,4',5,5'-H7CB(#189)	0.0001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
TEQ(Non-ortho PCBs)	-	0.020	0.020	0.010	0.020	0.000010	0.000010
TEQ(Mono-ortho PCBs)	-	0.0027	0.0033	0.0037	0.0058	0.00040	0.00050
TEQ(Total Co-PCBs)	-	0.023	0.023	0.014	0.026	0.00041	0.00051
TEQ(Total dioxins)	-	0.029	0.054	0.021	0.047	0.0018	0.00052

N.D.: Under the lower limit of detection. For 4,5-substitutes: 0.01pg/g. 6,7-s:0.02pg/g. 8-s:0.05pg/g.
For Non-orthos:0.1pg/g. Mono-orthos:1pg/g.

Table for 1997/8 Survey Results（ND = 0）

	TEQ (Total PCDD/Fs) [pg-TEQ/g]	TEQ (Total C-PCBs) [pg-TEQ/g]	Food intake [kg/day]	Total dioxin intake per person [pg-TEQ]	Dioxin in take per kg body weight (average weight: 50kg) [pg-TEQ/day･kg]
12	0.046	0.090	1.8	240	4.8
10	0.044	0.051	1.9	180	3.6
23	0.059	0.022	1.6	130	2.6
18	0.067	0.022	1.4	120	2.4
9	0.0082	0.024	2.8	90	1.8
19	0.0074	0.028	2.5	89	1.8
27	0.013	0.036	1.8	88	1.8
5	0.0013	0.049	1.7	86	1.7
44	0.031	0.023	1.5	81	1.6
25	0.0073	0.023	2.4	73	1.5
3	0.0012	0.029	2.2	66	1.3
35	0.012	0.034	1.4	64	1.3
13	0.0064	0.028	1.8	62	1.2
17	0.022	0.012	1.8	61	1.2
30	0.0072	0.031	1.6	61	1.2
43	0.0062	0.023	1.9	55	1.1
46	0.021	0.026	1.1	52	1.0
6	0.0062	0.023	1.6	47	0.94
38	0.0023	0.024	1.7	45	0.90
28	0.0073	0.012	2.3	44	0.88
15	0.0088	0.025	1.2	41	0.82
41	0.0020	0.023	1.5	38	0.76
24	0.0075	0.012	1.9	37	0.74
4	0.0066	0.012	1.8	33	0.66
8	0.00053	0.014	2.2	32	0.64
45	0.0065	0.014	1.4	29	0.58
16	0.0078	0.011	1.5	28	0.56
21	0.00021	0.012	1.9	23	0.46
26	0.0076	0.0012	2.4	21	0.42
32	0.0023	0.015	1.2	21	0.42
34	0.0013	0.013	1.5	21	0.42
33	0.0000090	0.0050	2.0	10	0.20
31	0.0013	0.0018	1.6	5.0	0.10
42	0.0015	0.00071	1.8	4.0	0.080
22	0.0010	0.00051	2.4	3.6	0.072
47	0.0014	0.00041	1.8	3.3	0.066
1	0.00021	0.0012	2.0	2.8	0.056
37	0.00064	0.00094	1.7	2.7	0.054
40	0.00064	0.00062	1.9	2.4	0.048
20	0.00042	0.00062	2.2	2.3	0.046
29	0.000015	0.00086	2.5	2.2	0.044
2	0.0000080	0.00081	2.1	1.7	0.034
14	0.00021	0.00051	2.3	1.7	0.034
36	0.00047	0.00031	1.7	1.3	0.026
48	0.000013	0.00051	1.8	0.94	0.019
11	0.0000070	0.00040	1.9	0.77	0.015
7	0.0000080	0.00030	1.7	0.51	0.010
39	0.000018	0.00020	1.6	0.35	0.0070
mean (arithmetric)	0.0091	0.016	1.8	44	0.88
mean (arithmetric)	0.0016	0.0060	1.8	17	0.34
median	0.0023	0.013	1.8	33	0.65

Shown in the order of concentration.

Table for 1997 Survey Results（ND = 0）

	TEQ (Total PCDD/Fs) [pg-TEQ/g]	TEQ (Total C-PCBs) [pg-TEQ/g]	Food intake [kg/day]	Total dioxin intake per person [pg-TEQ]	Dioxin in take per kg body weight (average weight: 50kg) [pg-TEQ/day･kg]
12	0.046	0.090	1.8	240	4.8
18	0.067	0.022	1.4	120	2.4
19	0.0074	0.028	2.5	89	1.8
44	0.031	0.023	1.5	81	1.6
35	0.012	0.034	1.4	64	1.3
17	0.022	0.012	1.8	61	1.2
43	0.0062	0.023	1.9	55	1.1
28	0.0073	0.012	2.3	44	0.88
41	0.0020	0.023	1.5	38	0.76
16	0.0078	0.011	1.5	28	0.56
26	0.0076	0.0012	2.4	21	0.42
34	0.0013	0.013	1.5	21	0.42
33	0.0000090	0.0050	2.0	10	0.20
42	0.0015	0.00071	1.8	4.0	0.080
47	0.0014	0.00041	1.8	3.3	0.066
37	0.00064	0.00094	1.7	2.7	0.054
40	0.00064	0.00062	1.9	2.4	0.048
20	0.00042	0.00062	2.2	2.3	0.046
29	0.000015	0.00086	2.5	2.2	0.044
36	0.00047	0.00031	1.7	1.3	0.026
48	0.000013	0.00051	1.8	0.94	0.019
11	0.0000070	0.00040	1.9	0.77	0.015
mean (arithmetric)	0.010	0.014	1.9	41	0.81
mean (arithmetric)	0.0014	0.0040	1.8	13	0.26
median	0.0018	0.0080	1.8	21	0.42

Shown in the order of concentration.

Table for 1998 Survey Results（ND = 0）

	TEQ (Total PCDD/Fs) [pg-TEQ/g]	TEQ (Total C-PCBs) [pg-TEQ/g]	Food intake [kg/day]	Total dioxin intake per person [pg-TEQ]	Dioxin in take per kg body weight (average weight: 50kg) [pg-TEQ/day･kg]
10	0.044	0.051	1.9	180	3.6
23	0.059	0.022	1.6	130	2.6
9	0.0082	0.024	2.8	90	1.8
27	0.013	0.036	1.8	88	1.8
5	0.0013	0.049	1.7	86	1.7
25	0.0073	0.023	2.4	73	1.5
3	0.0012	0.029	2.2	66	1.3
13	0.0064	0.028	1.8	62	1.2
30	0.0072	0.031	1.6	61	1.2
46	0.021	0.026	1.1	52	1.0
6	0.0062	0.023	1.6	47	0.94
38	0.0023	0.024	1.7	45	0.90
15	0.0088	0.025	1.2	41	0.82
24	0.0075	0.012	1.9	37	0.74
4	0.0066	0.012	1.8	33	0.66
8	0.00053	0.014	2.2	32	0.64
45	0.0065	0.014	1.4	29	0.58
21	0.00021	0.012	1.9	23	0.46
32	0.0023	0.015	1.2	21	0.42
31	0.0013	0.0018	1.6	5.0	0.10
22	0.0010	0.00051	2.4	3.6	0.072
1	0.00021	0.0012	2.0	2.8	0.056
2	0.0000080	0.00081	2.1	1.7	0.034
14	0.00021	0.00051	2.3	1.7	0.034
7	0.0000080	0.00030	1.7	0.51	0.010
39	0.000018	0.00020	1.6	0.35	0.0070
mean (arithmetric)	0.0082	0.018	1.8	47	0.93
mean (arithmetric)	0.0017	0.0085	1.8	21	0.41
median	0.0043	0.019	1.8	39	0.78

Shown in the order of concentration.

Table for 1997/8 Survey Results（ND = 0.5）

	TEQ (Total PCDD/Fs) [pg-TEQ/g]	TEQ (Total C-PCBs) [pg-TEQ/g]	Food intake [kg/day]	Total dioxin intake per person [pg-TEQ]	Dioxin in take per kg body weight (average weight: 50kg) [pg-TEQ/day･kg]
12	0.058	0.090	1.8	270	5.4
10	0.056	0.051	1.9	200	4.0
9	0.026	0.025	2.8	140	2.8
18	0.076	0.023	1.4	140	2.8
23	0.067	0.023	1.6	140	2.8
19	0.025	0.028	2.5	130	2.6
5	0.021	0.050	1.7	120	2.4
25	0.025	0.024	2.4	120	2.4
27	0.030	0.037	1.8	120	2.4
3	0.021	0.030	2.2	110	2.2
13	0.024	0.029	1.8	95	1.9
44	0.039	0.024	1.5	95	1.9
17	0.035	0.014	1.8	88	1.8
30	0.025	0.032	1.6	91	1.8
35	0.030	0.035	1.4	91	1.8
43	0.024	0.024	1.9	91	1.8
28	0.025	0.013	2.3	87	1.7
26	0.025	0.0076	2.4	78	1.6
38	0.022	0.025	1.7	80	1.6
8	0.021	0.015	2.2	79	1.6
6	0.024	0.024	1.6	77	1.5
24	0.025	0.013	1.9	72	1.4
29	0.021	0.0072	2.5	71	1.4
41	0.022	0.024	1.5	69	1.4
4	0.024	0.013	1.8	67	1.3
14	0.021	0.0069	2.3	64	1.3
21	0.021	0.013	1.9	65	1.3
22	0.021	0.0069	2.4	67	1.3
33	0.021	0.011	2.0	64	1.3
46	0.034	0.027	1.1	67	1.3
2	0.021	0.0072	2.1	59	1.2
15	0.026	0.026	1.2	62	1.2
20	0.021	0.0070	2.2	62	1.2
1	0.021	0.0076	2.0	57	1.1
11	0.021	0.0068	1.9	53	1.1
16	0.025	0.013	1.5	57	1.1
34	0.021	0.014	1.5	53	1.1
40	0.021	0.007	1.9	53	1.1
45	0.024	0.015	1.4	55	1.1
42	0.021	0.0071	1.8	51	1.0
47	0.021	0.0068	1.8	50	1.0
48	0.021	0.0069	1.8	50	1.0
37	0.021	0.0073	1.7	48	0.96
7	0.021	0.0067	1.7	47	0.94
36	0.021	0.0067	1.7	47	0.94
31	0.021	0.0079	1.6	46	0.92
32	0.022	0.016	1.2	46	0.92
39	0.021	0.0066	1.6	44	0.88
mean (arithmetric)	0.027	0.019	1.8	83	1.7
mean (arithmetric)	0.025	0.015	1.8	76	1.5
median	0.022	0.014	1.8	68	1.4

Shown in the order of concentration.

Table for 1997 Survey Results（ND = 0.5）

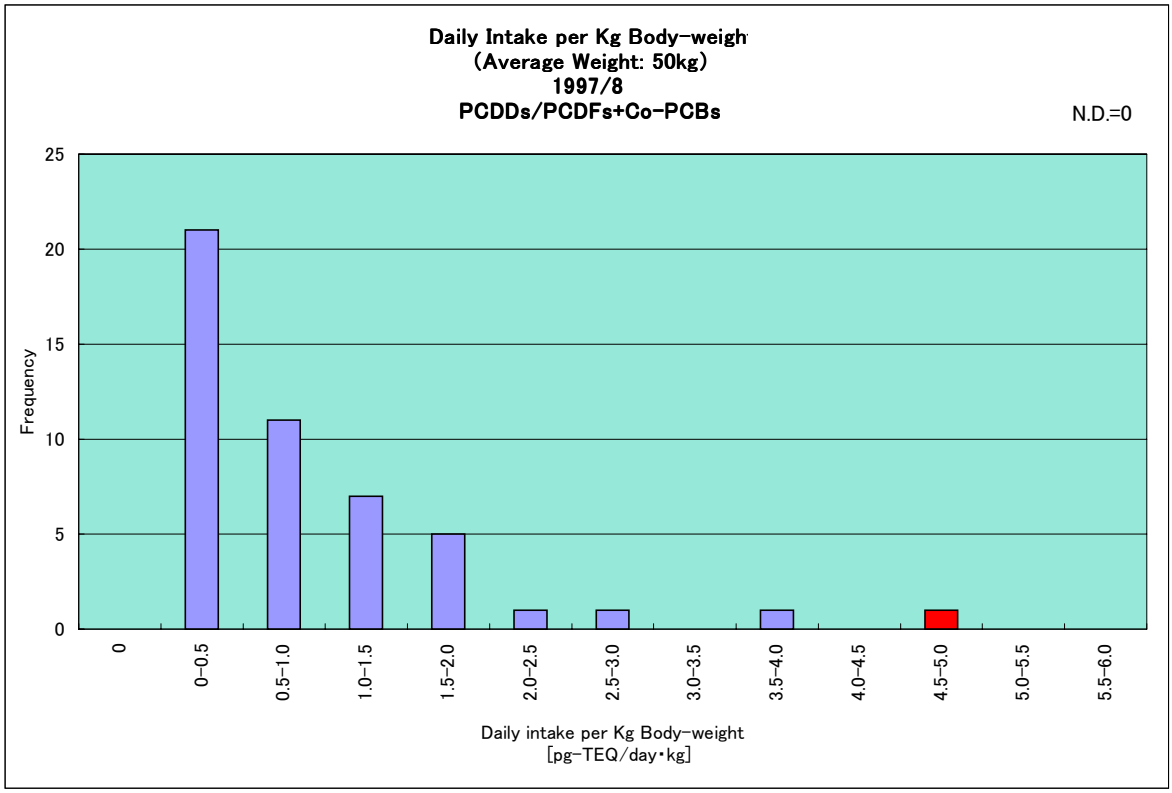
	TEQ (Total PCDD/Fs) [pg-TEQ/g]	TEQ (Total C-PCBs) [pg-TEQ/g]	Food intake [kg/day]	Total dioxin intake per person [pg-TEQ]	Dioxin in take per kg body weight (average weight: 50kg) [pg-TEQ/day･kg]
12	0.058	0.090	1.8	270	5.4
18	0.076	0.023	1.4	140	2.8
19	0.025	0.028	2.5	130	2.6
44	0.039	0.024	1.5	95	1.9
17	0.035	0.014	1.8	88	1.8
35	0.030	0.035	1.4	91	1.8
43	0.024	0.024	1.9	91	1.8
28	0.025	0.013	2.3	87	1.7
26	0.025	0.0076	2.4	78	1.6
29	0.021	0.0072	2.5	71	1.4
41	0.022	0.024	1.5	69	1.4
33	0.021	0.011	2.0	64	1.3
20	0.021	0.0070	2.2	62	1.2
11	0.021	0.0068	1.9	53	1.1
16	0.025	0.013	1.5	57	1.1
34	0.021	0.014	1.5	53	1.1
40	0.021	0.0070	1.9	53	1.1
42	0.021	0.0071	1.8	51	1.0
47	0.021	0.0068	1.8	50	1.0
48	0.021	0.0069	1.8	50	1.0
37	0.021	0.0073	1.7	48	0.96
36	0.021	0.0067	1.7	47	0.94
mean (arithmetric)	0.028	0.017	1.9	82	1.6
mean (arithmetric)	0.026	0.013	1.8	73	1.5
median	0.022	0.012	1.8	67	1.4

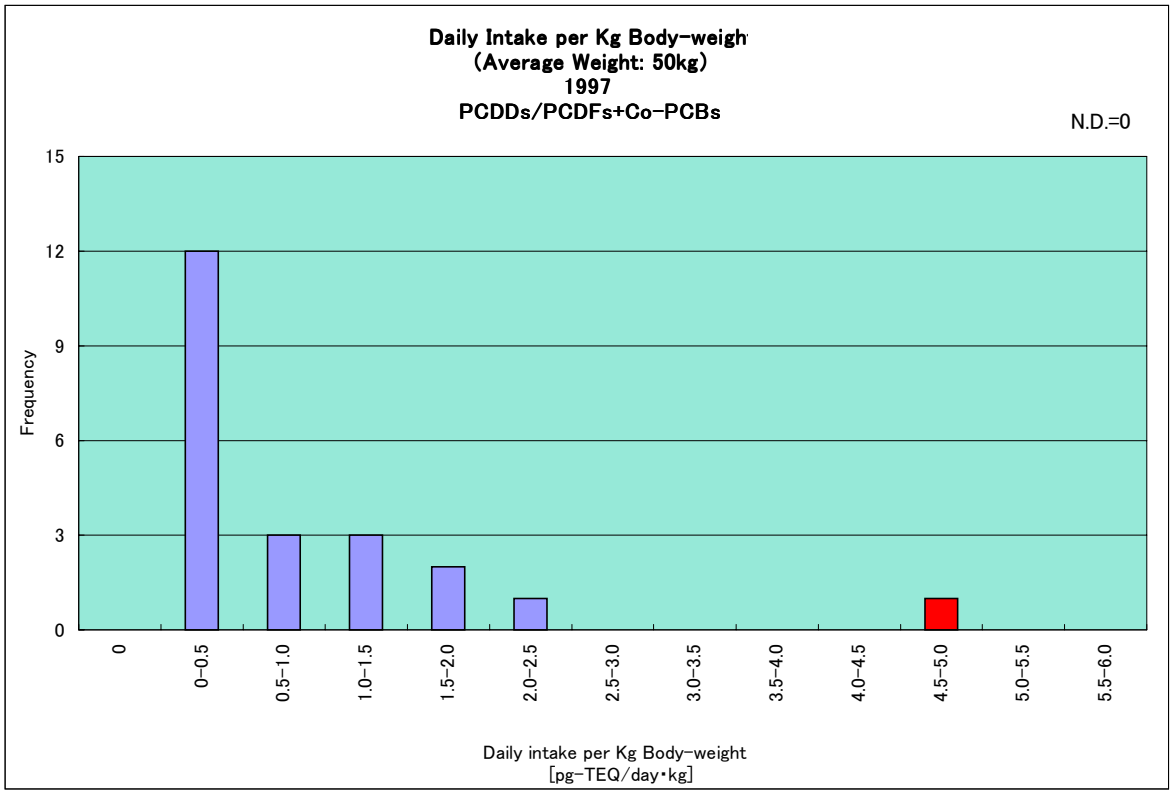
Shown in the order of concentration.

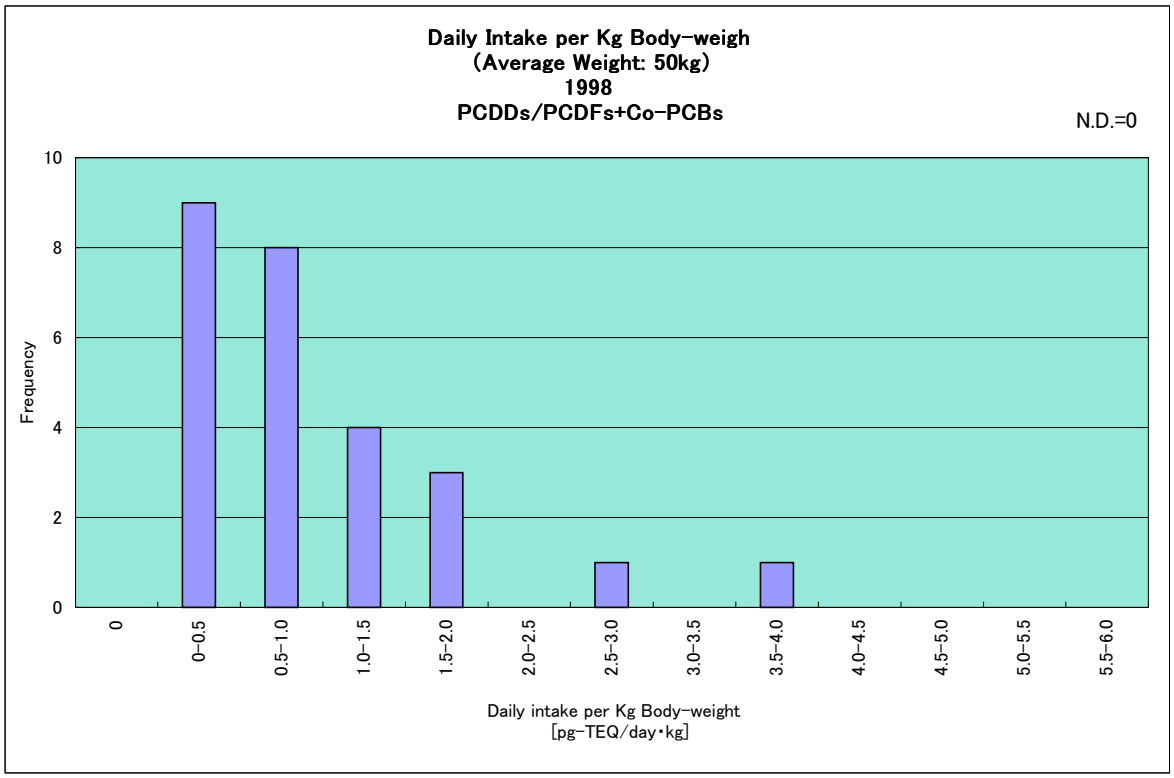
Table for 1998 Survey Results（ND = 0.5）

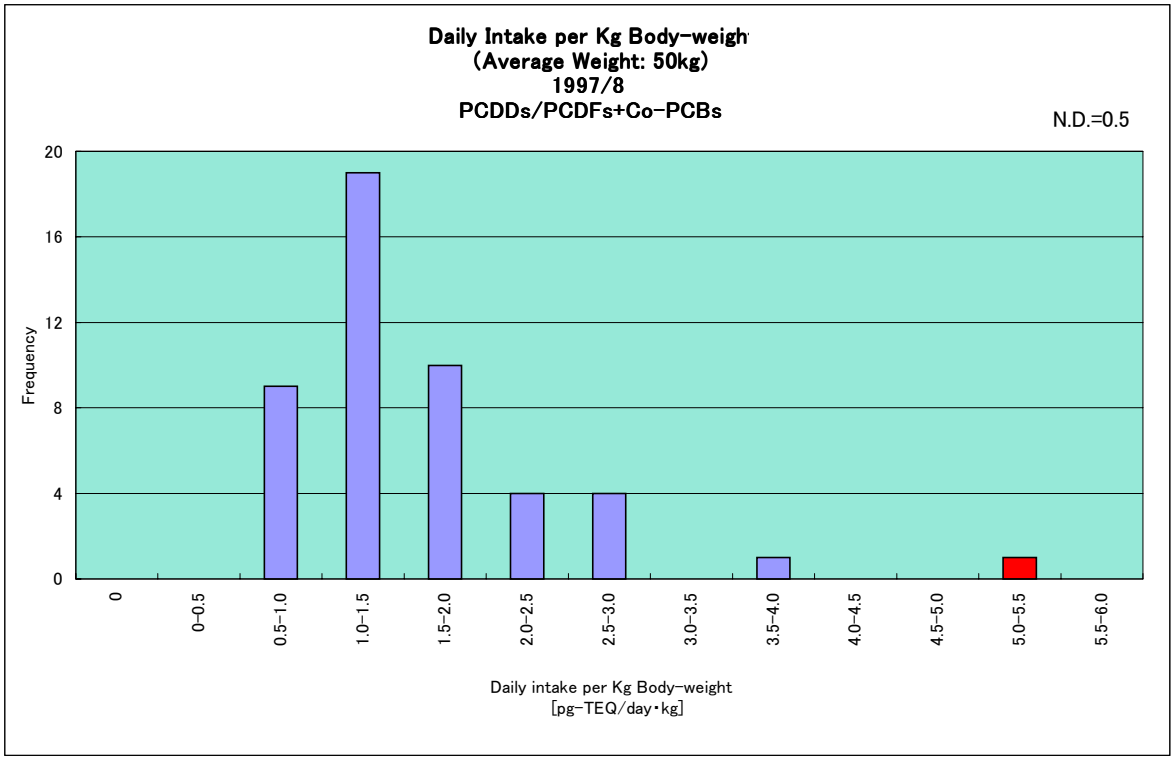
	TEQ (Total PCDD/Fs) [pg-TEQ/g]	TEQ (Total C-PCBs) [pg-TEQ/g]	Food intake [kg/day]	Total dioxin intake per person [pg-TEQ]	Dioxin in take per kg body weight (average weight: 50kg) [pg-TEQ/day･kg]
10	0.056	0.051	1.9	200	4.0
9	0.026	0.025	2.8	140	2.8
23	0.067	0.023	1.6	140	2.8
5	0.021	0.050	1.7	120	2.4
25	0.025	0.024	2.4	120	2.4
27	0.030	0.037	1.8	120	2.4
3	0.021	0.030	2.2	110	2.2
13	0.024	0.029	1.8	95	1.9
30	0.025	0.032	1.6	91	1.8
8	0.021	0.015	2.2	79	1.6
38	0.022	0.025	1.7	80	1.6
6	0.024	0.024	1.6	77	1.5
24	0.025	0.013	1.9	72	1.4
4	0.024	0.013	1.8	67	1.3
14	0.021	0.0069	2.3	64	1.3
21	0.021	0.013	1.9	65	1.3
22	0.021	0.0069	2.4	67	1.3
46	0.034	0.027	1.1	67	1.3
2	0.021	0.0072	2.1	59	1.2
15	0.026	0.026	1.2	62	1.2
1	0.021	0.0076	2.0	57	1.1
45	0.024	0.015	1.4	55	1.1
7	0.021	0.0067	1.7	47	0.94
31	0.021	0.0079	1.6	46	0.92
32	0.022	0.016	1.2	46	0.92
39	0.021	0.0066	1.6	44	0.88
mean (arithmetric)	0.026	0.021	1.8	84	1.7
mean (arithmetric)	0.025	0.017	1.8	78	1.5
median	0.023	0.020	1.8	70	1.4

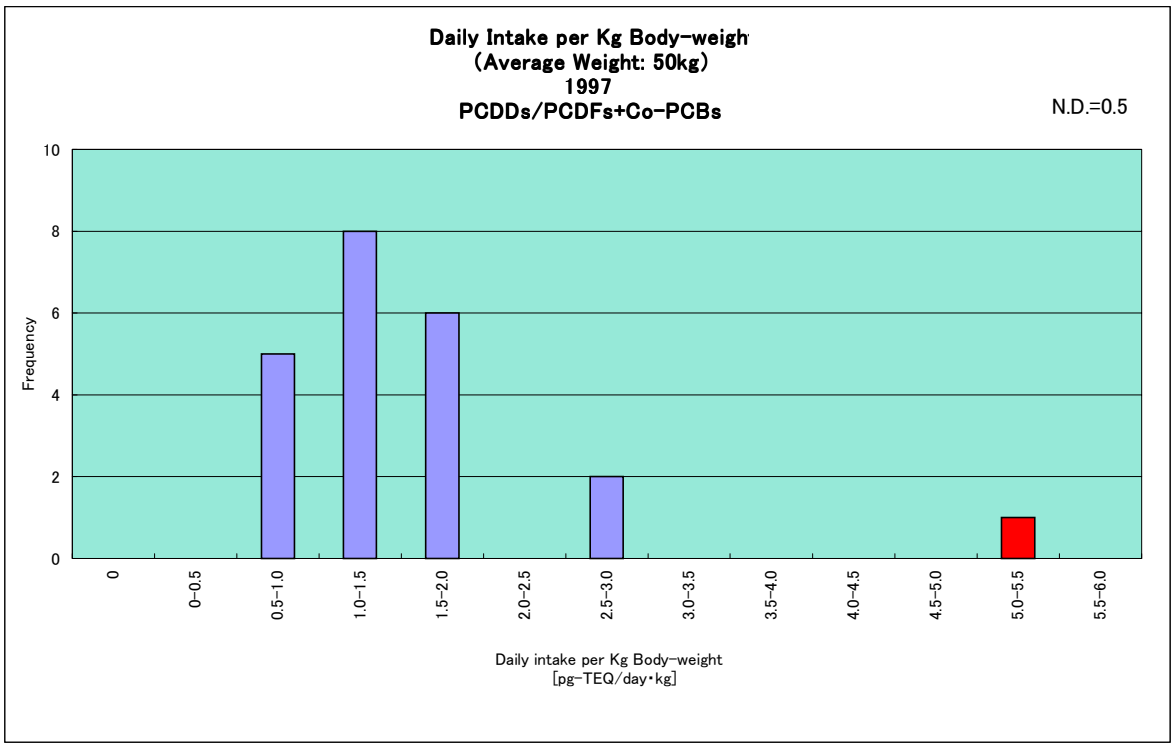
Shown in the order of concentration.

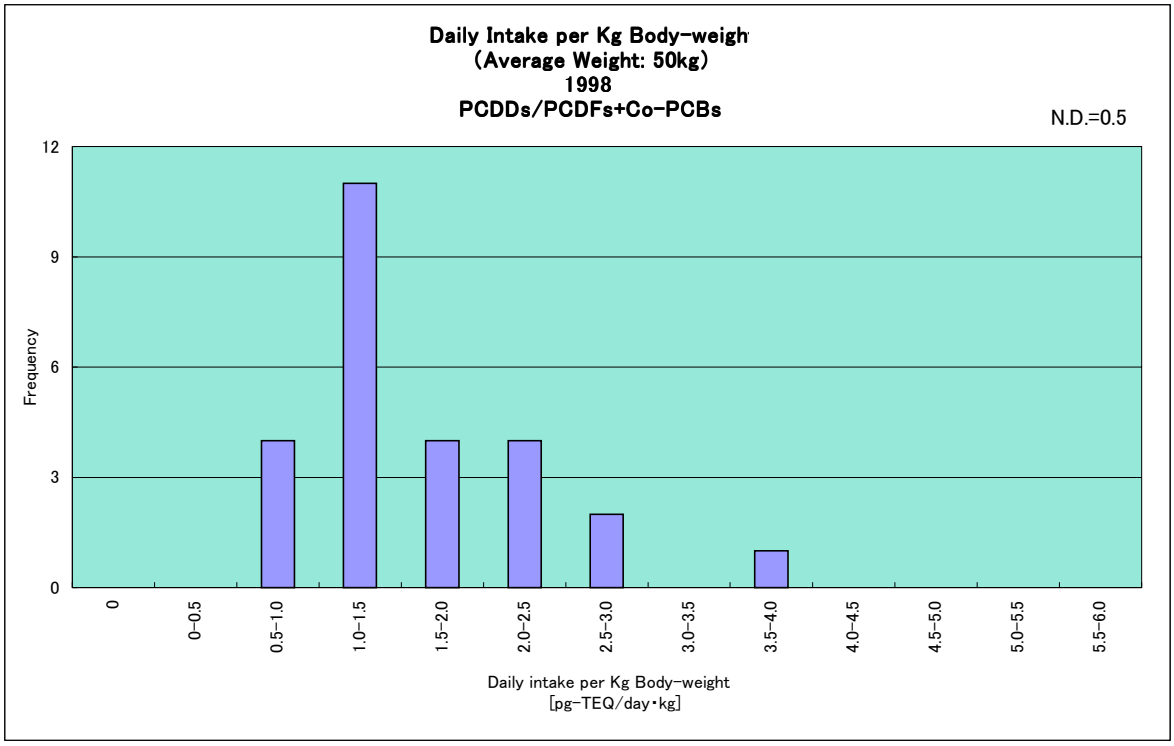

Daily Intake per Kg Body-weigh
(Average Weight: 50kg)
1997/8
PCDDs/PCDFs+Co-PCBs
N.D.=0
Frequency
25
20
15
10
5
0
0
0-0.5
0.5-1.0
1.0-1.5
1.5-2.0
2.0-2.5
2.5-3.0
3.0-3.5
3.5-4.0
4.0-4.5
4.5-5.0
5.0-5.5
5.5-6.0
Daily intake per Kg Body-weight
[pg-TEQ/day･kg]


Daily Intake per Kg Body-weigh
(Average Weight: 50kg)
1997
PCDDs/PCDFs+Co-PCBs
N.D.=0
Frequency
15
12
9
6
3
0
0
0-0.5
0.5-1.0
1.0-1.5
1.5-2.0
2.0-2.5
2.5-3.0
3.0-3.5
3.5-4.0
4.0-4.5
4.5-5.0
5.0-5.5
5.5-6.0
Daily intake per Kg Body-weight
[pg-TEQ/day･kg]


Daily Intake per Kg Body-weigh
(Average Weight: 50kg)
1998
PCDDs/PCDFs+Co-PCBs
N.D.=0
Frequency
0
2
4
6
8
10
0
0-0.5
0.5-1.0
1.0-1.5
1.5-2.0
2.0-2.5
2.5-3.0
3.0-3.5
3.5-4.0
4.0-4.5
4.5-5.0
5.0-5.5
5.5-6.0
Daily intake per Kg Body-weight
[pg-TEQ/day･kg]


Daily Intake per Kg Body-weigh
(Average Weight: 50kg)
1997/8
PCDDs/PCDFs+Co-PCBs
N.D.=0.5
Frequency
0
4
8
12
16
20
0
0-0.5
0.5-1.0
1.0-1.5
1.5-2.0
2.0-2.5
2.5-3.0
3.0-3.5
3.5-4.0
4.0-4.5
4.5-5.0
5.0-5.5
5.5-6.0
Daily intake per Kg Body-weight
[pg-TEQ/day･kg]


Daily Intake per Kg Body-weigh
(Average Weight: 50kg)
1997
PCDDs/PCDFs+Co-PCBs
N.D.=0.5
Frequency
10
8
6
4
2
0
0
0-0.5
0.5-1.0
1.0-1.5
1.5-2.0
2.0-2.5
2.5-3.0
3.0-3.5
3.5-4.0
4.0-4.5
4.5-5.0
5.0-5.5
5.5-6.0
Daily intake per Kg Body-weight
[pg-TEQ/day･kg]


Daily Intake per Kg Body-weigh
(Average Weight: 50kg)
1998
PCDDs/PCDFs+Co-PCBs
N.D.=0.5
Frequency
12
9
6
3
0
0
0-0.5
0.5-1.0
1.0-1.5
1.5-2.0
2.0-2.5
2.5-3.0
3.0-3.5
3.5-4.0
4.0-4.5
4.5-5.0
5.0-5.5
5.5-6.0
Daily intake per Kg Body-weight
[pg-TEQ/day･kg]