Chapter 4.

Summary of the Results of Wildlife Monitoring (Fiscal Year 1998)

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1. Purpose of the survey

The purpose of the survey is to grasp the environmental pollution by chemical substances on a yearly basis by way of conducting regular and systematic survey of the pollution level for wildlife by chemical substances (mainly Class 1 Specified Chemical Substances) which are thought to be harmful to human health and the environment.

2. Surveyed areas

Surveyed areas were selected where the pollution level in specific areas (around urban cities and industrial areas) and in periphery of the Japanese Archipelagos could be grasped comprehensively on long time basis.

The surveyed areas in the fiscal year 1998 survey, were 17 areas from the sea, 1 from fresh water, and 2 from land areas, in total 20 areas.

Figure 4-1 shows the surveyed areas and the name of the wildlife collected for survey.

3. Surveyed wildlife

The kinds of surveyed wildlife were selected for their significance and usefulness as a sample, together with the consideration for international comparison. A total of 12 kinds (mainly seabass and common mussel) were selected in the fiscal year 1998; 8 fishes, 2 shellfishes and 2 birds.

The characteristics of each kind of wildlife chosen for the survey are listed in Table 4-1.

5 samples were prepared from fishes, shellfishes and birds obtained from each surveyed area. In this case, when one body was not enough for the necessary quantity of a sample (for example, common mussel) more than one body were used for a sample.
Concerning each sample, the following parts of the body were taken and used as samples for analysis.

- fish: muscles
- shellfish: shucked shellfish

・ bird: pectoralis muscle

4. Surveyed chemical substances

The survey was conducted mainly concerning Class 1 Specified Chemical Substances. Taking into consideration past survey results, those chemical substances which had no difference in the detected level, or were almost not detected at all need not be surveyed every year. They have been the subject of the survey with appropriate intervals of time.

At present, 20 substances excluding organotin compounds as shown in Table 4-2 are subject to the monitoring survey.

Chlorinated organic compounds were analyzed using GC/ECD and organotin compounds were analyzed using GC/ECD or GC/FPD. However, when it could not be distinguished with other components, quantitative and qualitative analysis were conducted using GC/MS.

5. Survey results

Survey results in the fiscal year 1998 are as follows for each surveyed substance except for organotin compounds which are shown in Chapter 6. The figures in parentheses show the figures for FY1997 or those for 1996, if not surveyed in FY1997. (ppm indicates μg/g-wet)

(1) PCB and HCB

① PCB and HCB were designated as Class 1 Specified Chemical Substances based on the Chemical Substances Control Law in June, 1974, and August, 1979, respectively, since they are not readily biodegradable etc.. It is thus important from many aspects to follow their concentration levels in the environment. In this survey, PCB and HCB were selected as substances subject to the survey since fiscal year 1978, and monitoring has been conducted.

② PCB was detected in fishes, shellfishes and birds. The detection range for fishes and shellfishes were 0.01 to 0.29 μg/g-wet (0.01 to 0.37 μg/g-wet) and the detection frequency was 49 out of 100 samples (60 out of 100 samples) and the detection frequency in terms of area was 10 out of 20 areas. The detection range for birds was 0.01 to 0.02 μg/g-wet (0.02 μg/g-wet) and the detection frequency was 5 out of 10 samples (5 out of 10 samples) and the detection frequency in terms of area was 1 out of 2 areas.

HCB was detected in fishes and birds. The detection range for fishes was 0.001 μg/g-wet (0.001 μg/g-wet), and the detection frequency was 8 out of 70 samples (5 out of 70

samples), and the detection frequency in terms of area was 2 out of 14 areas. For birds, the detection range was 0.001 μg/g-wet (0.001 to 0.002 μg/g-wet) and the detection frequency was 3 out of 10 samples (5 out of 10 samples) and the detection frequency in terms of area was 1 out of 2 areas.

③ Use of PCB was generally discontinued in 1972 and designated as Specially Controlled Industrial Waste based on the Law Concerning Disposal and Cleaning of Industrial Waste in July 1992. But PCB is still detected in total 11 areas. The survey results in fiscal year 1998 indicate that PCB still persists in wide area of the environment.

As for PCB, from the viewpoint of global pollution monitoring, it remains necessary to continue monitoring of them and their chemical fate in the environment should be followed.

On the other hand, the level of detected concentration for HCB is low and the detection circumstance is generally leveling out or being improved. Although the substance is known to be formed unintentionally, if it is taken into consideration that the substantial production and use have already been ceased, the pollution circumstance is expected to be further improved. As for HCB, from the viewpoint of global pollution monitoring, it remains necessary to continue monitoring of them and their chemical fate in the environment should be followed.

(2) Drins (Dieldrin)

① Dieldrin is a kind of pesticides of the drins. The use of drins as agricultural chemicals is said to have been at its peak in 1955-1965, but its manufacture and use were substantially discontinued since 1971, but dieldrin had been used as an antitermite agent. However, in October, 1981, it was designated as a Class 1 Specified Chemical Substance based on the Chemical Substances Control Law, so that use of it was totally ceased together with the regulation as an agricultural chemical. In this survey, it was selected as the substance subject to the survey since the fiscal year 1978, and monitoring has been conducted.

② Dieldrin was detected in fishes, shellfishes and birds. The detection range for fishes and shellfishes was 0.001 to 0.055 μg/g-wet (0.001 to 0.071 μg/g-wet) and the detection frequencies were 14 out of 100 samples (19 out of 100 samples), and the detection frequency in terms of area was 4 out of 20 areas. For birds, the detection range was 0.001 μg/g-wet (0.001 μg/g-wet) and the detection frequency in terms of area was 1 out of 2 areas.

③ As for Dieldrin, both the detection frequency and the detection level are considered to be lowering in these days. But it remains necessary to continue monitoring of it, from the global monitoring point of view, and to grasp its tendency.

(3) DDTs and their derivatives

① DDT is a kind of pesticides which was popularly used together with HCH and Drins.

Use of it as an agricultural chemical has been discontinued since 1971. In October, 1981, it was designated as a Class 1 Specified Chemical Substance together with the Drins. DDT has several isomers based on the location of chlorine attached to the benzene ring. In this survey, p,p'-DDT which is an active component of DDT, o,p'-DDT, and the 4 kinds of derivatives, o,p'-DDD, p,p'-DDD, o,p'-DDE and p,p'-DDE which are the degradation products of DDT in the environment, were selected as substances subject to the survey since the fiscal year 1978, and monitoring has been conducted. In the survey of FY 1998, these 6 substances were the subject of the survey.

② p,p'-DDT was detected in fishes and birds. The detection range for fishes was 0.001 to 0.005 μg/g-wet (0.001 to 0.047 μg/g-wet) and the detection frequency was 35 out of 70 samples (26 out of 70 samples) and the detection frequency in terms of area was 9 out of 14 areas. The detection range for birds was 0.001 to 0.002 μg/g-wet (not detected) and the detection frequency was 6 out of 10 samples (not detected for all of 10 samples) and detection frequency in terms of area was 2 out of 2 areas.

o,p'-DDT was detected only in fishes. The detection range was 0.001 μg/g-wet (0.001 to 0.008 μg/g-wet) and the detection frequency was 2 out of 70 samples (9 out of 70 samples) and the detection frequency in terms of area was 1 out of 14 areas.

p,p'-DDE was detected in fishes, shellfishes and birds. The detection range for fishes and shellfishes was 0.001 to 0.021 μg/g-wet (0.001 to 0.033 μg/g-wet) and the detection frequency was 79 out of 100 samples (65 out of 100 samples) and the detection frequency in terms of area was 17 out of 20 areas. As for birds, the detection range was 0.010 to 0.14 μg/g-wet (0.009 to 0.149 μg/g-wet) and the detection frequency was 10 out of 10 samples (10 out of 10 samples) and the detection frequency in terms of area was 2 out of 2 areas.

o,p'-DDE was detected only in fishes. The detection range was 0.001 to 0.002 μg/g-wet (0.001 to 0.003 μg/g-wet) and the detection frequency was 9 out of 70 samples (6 out of 70 samples) and the detection frequency in terms of area was 2 out of 14 areas.

p,p'-DDD was detected in fishes and shellfishes. The detection range was 0.001 to 0.009 μg/g-wet (0.001 to 0.009 μg/g-wet) and the detection frequency was 39 out of 100 samples (45 out of 100 samples) and the detection frequency in terms of area was 10 out of 20 areas.

o,p'-DDD was detected only in fishes. The detection range was 0.001 to 0.003 μg/g-wet (0.001 to 0.004 μg/g-wet) and the detection frequency was 6 out of 70 samples (10 out of 70 samples) and the detection frequency in terms of area was 2 out of 14 areas.

③ There has been no great difference in the detection range for each isomers and as before p,p'-DDE was detected in birds with high concentration levels in comparison with detected values for other DDTs. The detected frequencies for p,p'-DDT increased compared to that of the previous year. Since p,p'-DDTs persist widely in the environment although at low concentration levels, it remains necessary to continue monitoring of them hereafter, from the view point of global pollution monitoring.

(4) Chlordanes

① In the Detailed Environmental Survey conducted in fiscal year 1982, chlordanes were detected widely in the environment in bottom sediments and fishes, so that it was added to the substances subject to the survey since the fiscal year 1983. In Japan, it has been used for antitermite agents, lumber (primary processing), and plywood, but since it is not readily biodegradable, it was designated as a Class 1 Specified Chemical Substance based on the Chemical Substances Control Law in September, 1986. The compositions of chlordanes manufactured for industrial purposes are complicated, but in this survey, the 5 chlordanes were selected as substances subject to the survey which had high detection frequencies in the results of the fiscal year 1982 Detailed Environmental Survey for 8 chlordanes.

② Trans-nonachlor and oxychlordane were detected in fishes, shellfishes and birds. And the other 3 chlordanes were detected in fishes and shellfishes. For fishes the detection range of each chlordane was 0.001 to 0.010 μg/g-wet (0.001 to 0.011 μg/g-wet) and that of the whole chlordanes was 0.001 to 0.026 μg/g-wet (0.001 to 0.025 μg/g-wet). For shellfishes, the detection range of each chlordane was 0.001 to 0.016 μg/g-wet (0.001 to 0.023 μg/g-wet) and that of the whole chlordane was 0.002 to 0.022 μg/g-wet (0.002 to 0.033 μg/g-wet). For birds, the detection range of each chlordane was 0.001 to 0.002 μg/g-wet (0.001 to 0.002 μg/g-wet) and that of the whole chlordane was 0.002 μg/g-wet (0.001 to 0.002 μg/g-wet). The detection frequencies of these chlordanes for fishes and shellfishes were still high and it was 40 out of 70 samples (40 out of 70 samples) for fishes and the detection frequency in terms of area was 9 out of 14 areas. And for shellfishes the detection frequency was 20 out of 30 samples (20 out of 30 samples) and the detection frequency in terms of area was 4 out of 6 areas. And for birds, the detection frequency of trans-nonachlor was 6 out of 10 samples (5 out of 10 samples) and the detection frequency in terms of area was so high as 2 out of 2 areas.

③ Since chlordanes had been used until recently and the detection frequency is high, it remains necessary to continue to carefully follow their persistence in the environment hereafter, also from the viewpoint of global pollution monitoring.

(5) HCHs (α-HCH and β-HCH)

① HCHs had been used as agricultural chemicals in the past, but use of them has been discontinued since 1971. There are many isomers of HCHs, but in this survey, 4 isomers, α, β, γ, and δ, were selected as substances subject to the survey, and monitoring has been conducted since the fiscal year 1978. Monitoring was conducted for the 2 isomers, α and β in the fiscal year 1998.

② α-HCH was detected in fishes and shellfishes, and β-HCH was detected in fishes and birds. The detection range of α-HCH in fishes and shellfishes was 0.001 to 0.002 μg/g-wet (0.001 μg/g-wet) and the detection frequency was 11out of 100 samples (4 out of 100 samples) and the detection frequency in terms of area was 3 out of 20 areas.

The detection ranges of β-HCH in fishes and birds were 0.001 to 0.003 μg/g-wet (0.001 to 0.007 μg/g-wet) and 0.001 to 0.002 μg/g-wet (0.003 to 0.009 μg/g-wet), respectively. The detection frequencies were 10 out of 70 samples (12 out of 70 samples) and 10 out of 10 samples (10 out of 10 samples), respectively. The detection frequencies in terms of area were 2 out of 14 areas and 2 out of 2 areas.

③ HCH isomers except γ-isomer are said to have high persistence, and it is necessary to monitor and confirm their persistence in the environment by means of continued survey, from the point of view of global pollution monitoring.

Fig. 4-1 Surveyed Areas and Species for Wildlife Monitoring (Fiscal Year 1998)

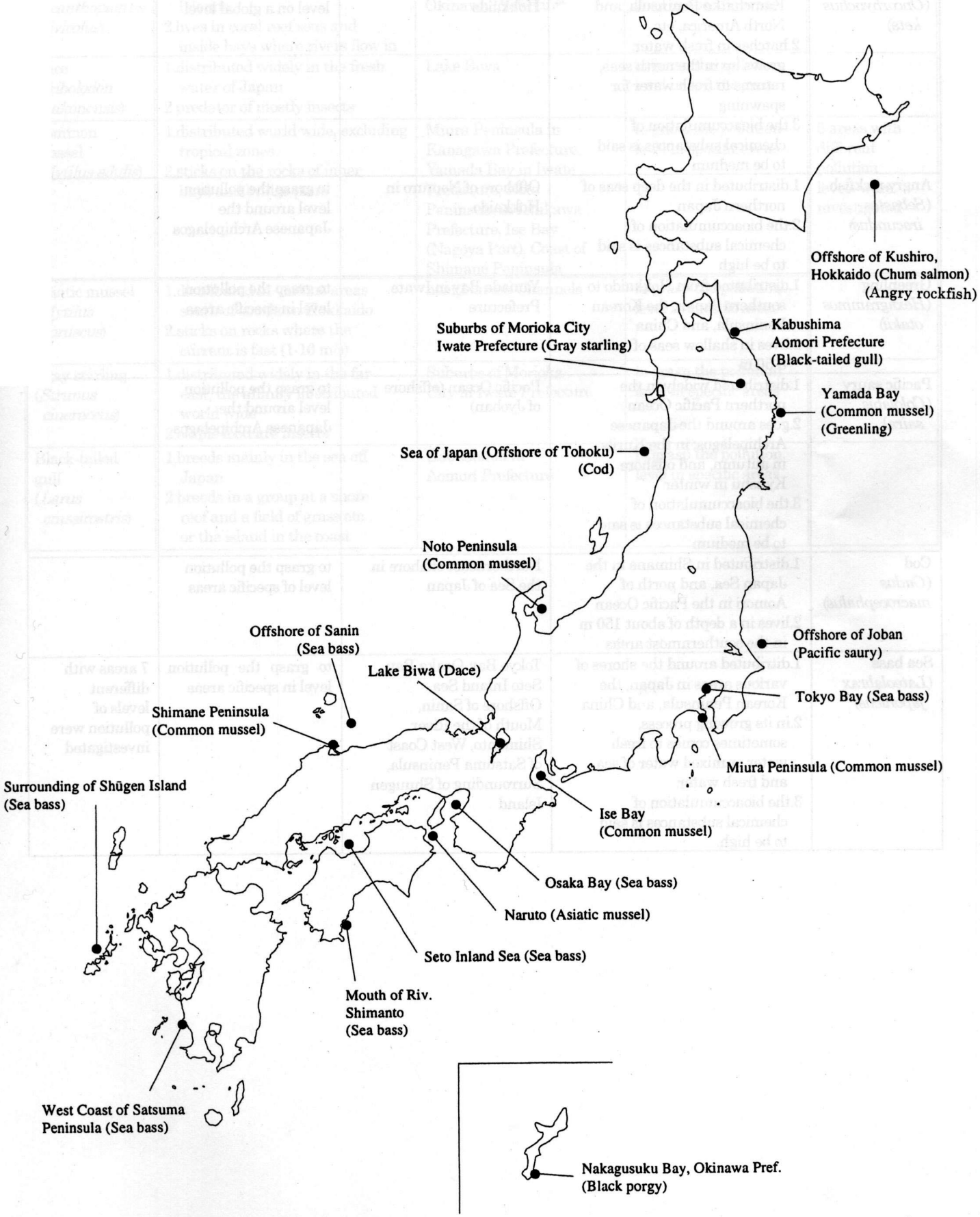

Table 4-1 Characteristics of Species Subject to Wildlife Monitoring

Species	Characteristics of species	Sampling areas	Object of investigation	Notes
Chum salmon (*Oncorhynchus keta*)	1.distributed in Hokkaido, Kamchatka Peninsula, and North America, etc. 2.hatches in fresh water, grows up in the north seas, returns to fresh water for spawning 3.the bioaccumulation of chemical substances is said to be medium	Offshore of Kushiro in Hokkaido	to grasp the pollution level on a global level	
Angry rockfish□(*Sebastes iracundus*)	1.distributed in the deep seas of northern Japan 2.the bioaccumulation of chemical substances is said to be high	Offshore of Nemuro in Hokkaido.	to grasp the pollution level around the Japanese Archipelagos	
Greenling□(*Hexagrammos otakii*)	1.distributed from Hokkaido to southern Japan, the Korean Peninsula, and China□2.lives in shallow seas of 5-50 m	Yamada Bay in Iwate Prefecture	to grasp the pollution level in specific areas	
Pacific saury(*Cololabis saira*)	1.distributed widely in the northern Pacific Ocean 2.goes around the Japanese Archipelagos; in the Kurils in autumn, and offshore Kyushu in winter 3.the bioaccumulation of chemical substances is said to be medium	Pacific Ocean (offshore of Jyoban)	to grasp the pollution level around the Japanese Archipelagos	
Cod□(*Gadus macrocephalus*)	1.distributed in Shimane in the Japan Sea, and north of Aomori in the Pacific Ocean 2.lives in a depth of about 150 m in the southernmost areas	Northerneast offshore in the Sea of Japan	to grasp the pollution level of specific areas	
Sea bass(*Lateolabrax japonicus*)	1.ditributed around the shores of various areas in Japan, the Korean Peninsula, and China 2.in its growing process, sometimes comes to fresh water or mixed water of sea and fresh water. 3.the bioaccumulation of chemical substances is said to be high.	Tokyo Bay, Osaka Bay, Seto Inland Sea, Offshore of Sanin, Mouth of the River Shimanto, West Coast of Satsuma Peninsula, Surrounding of Shuugen Island	to grasp the pollution level in specific areas	7 areas with different levels of pollution were investigated

Table 4-1 Characteristics of Species Subject to Wildlife Monitoring (Continued)

Species	Characteristics of species	Sampling areas	Object of investigation	Notes
Black porgy(*Acanthopagrus sivicolus*)	1.distributed in the Nansei Islands 2.lives in coral reef seas and inside bays where rivers flow in	Nakagusuku Bay in Okinawa Prefecture	to grasp the pollution level in specific areas	
Dace(*Tribolodon hakonensis*)	1.distributed widely in the fresh water of Japan 2.predator of mostly insects	Lake Biwa	to grasp the pollution level in specific areas	
Common mussel(*Mytilus edulis*)	1.distributed world wide, excluding tropical zones 2.sticks on the rocks of inner bays and bridge piers	Miura Peninsula in Kanagawa Prefecture, Yamada Bay in Iwate Prefecture, Noto Peninsula in Ishikawa Prefecture, Ise Bay (Nagoya Port), Coast of Shimane Peninsula	to grasp the pollution level in specific areas	5 areas with different pollution levels were investigated
Asiatic mussel(*Mytilus coruscus*)	1.distributed in various areas south of southern Hokkaido 2.sticks on rocks where the current is fast (1-10 m/s)	near Naruto Channels	to grasp the pollution level in specific areas	
Gray starling(*Strunus cineraceus*)	1.distributed widely in the far east, the affinity ldistributed world wide 2.staple food are insects	Suburbs of Morioka City in Iwate Prefecture	to grasp the pollution level in specific areas	
Black-tailed gull□(*Larus crassirostris*)	1.breeds mainly in the sea off Japan 2.breeds in a group at a shore reef and a field of grass etc. or the island in the coast	Kabushima in Aomori Prefecture	to grasp the pollution level in specific areas	

Table4-2　Results of Wildlife Monitoring (Fiscal Year 1998)

(Unit : μ g/g-wet)

Substance		Fish		Shellfishes		Birds		Total	
		Detected freq.	Detection range	Detected freq.	Detection range	Detected freq.	Detection range	Detected freq.	Detection range
PCBs	PCB	39	0.01 ～0.29	10	0.02～0.09	5	0.01 ～0.02	54	0.01 ～0.29
	HCB *	8	0.001	0	－	3	0.001	11	0.001
Drins	Dieldrin *	6	0.001～0.002	8	0.001～0.055	5	0.001	19	0.001～0.055
DDTs	o,p'-DDT *	2	0.001	0	－	0	－	2	0.001
	p,p'-DDT	35	0.001～0.005	0	－	6	0.001～0.002	41	0.001～0.005
	o,p'-DDE *	9	0.001～0.002	0	－	0	－	9	0.001～0.002
	p,p'-DDE	59	0.001～0.021	20	0.001～0.003	10	0.010～0.14	89	0.001～0.14
	o,p'-DDD *	6	0.001～0.003	0	－	0	－	6	0.001～0.003
	p,p'-DDD	29	0.001～0.009	10	0.001～0.003	0	－	39	0.001～0.009
Chlordanes	trans-Chlordane	15	0.002～0.004	20	0.001～0.004	0	－	35	0.001～0.004
	cis-Chlordane	25	0.001～0.010	20	0.001～0.016	0	－	45	0.001～0.016
	trans-Nonachlor	40	0.001～0.008	10	0.002～0.003	6	0.001～0.002	56	0.001～0.008
	cis-Nonachlor	18	0.001～0.006	5	0.001	0	－	23	0.001～0.006
	Oxychlordane	5	0.001	5	0.002～0.003	1	0.001	11	0.001～0.003
	Total-Chlordanes	40	0.001～0.026	20	0.002～0.022	6	0.002	66	0.001～0.026
HCHs	α-HCH *	8	0.001～0.002	3	0.001	0	－	11	0.001～0.002
	β-HCH *	10	0.002～0.003	0	－	10	0.001～0.002	20	0.002～0.003
Organotin compounds	TBT	17	0.05～0.09	10	0.06～0.11	0	－	27	0.05～0.11
	TPT	14	0.02～0.05	0	－	0	－	14	0.02～0.05
Total samples		70		30		10		110	

(Note) * : The result of each material is compared with the result in fiscal year 1996.