Chapter 3 Results of the Environmental Monitoring in FY 2007

1. Purpose of the survey

Environmental Monitoring is aimed at conducting an annual survey of the environmental persistence of target chemicals listed in the Stockholm Convention on Persistent Organic Pollutants (hereafter, the Stockholm Convention), and the possible candidate chemicals, and highly persistent chemicals among the Specified Chemical Substances and Monitored Chemical Substances under the Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances (Law No. 117 of 1973) (hereafter, the Chemical Substances Control Law), whose environmental standards are not yet established but whose change in persistence in the environment must be understood.

*POPs: persistent organic pollutants

2. Target chemicals

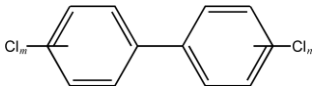
In the FY 2007 Environmental Monitoring, 10 chemicals (groups) included in the Stockholm Convention (except for polychlorinated-*p*-dioxin and polychlorinated dibenzofuran) (hereafter, POPs), 1 type of HCHs that is a possible candidate for inclusion in the Stockholm Convention, and 7 chemicals (groups), namely, acrylamide, trichlorobenzenes, tetrachlorobenzenes, pentachlorobenzene, tetrabromobisphenol A, hexachlorobuta-1,3-diene, and hexabromobenzene, were designated as target chemicals. The combinations of target chemicals and the monitoring media are given below.

Target chemicals		Monitored media			
No	Name	Surface water	Sediment	Wildlife	Air
[1]	Polychlorinated biphenyls (PCBs) [1-1] Monochlorobiphenyls [1-2] Dichlorobiphenyls [1-3] Trichlorobiphenyls [1-4] Tetrachlorobiphenyls [1-4-1] 3,3',4,4'-Tetrachlorobiphenyl（#77） [1-4-2] 3,4,4',5-Tetrachlorobiphenyl（#81） [1-5] Pentachlorobiphenyls [1-5-1] 2,3,3',4,4'-Pentachlorobiphenyl（#105） [1-5-2] 2,3,4,4',5-Pentachlorobiphenyl（#114） [1-5-3] 2,3',4,4'-5-Pentachlorobiphenyl（#118） [1-5-4] 2',3,4,4',5-Pentachlorobiphenyl（#123） [1-5-5] 3,3',4,4',5-Pentachlorobiphenyl（#126） [1-6] Hexachlorobiphenyls [1-6-1] 2,3,3',4,4',5-Hexachlorobiphenyl（#156） [1-6-2] 2,3,3',4,4',5'-Hexachlorobiphenyl（#157） [1-6-3] 2,3',4,4',5,5'-Hexachlorobiphenyl（#167） [1-6-4] 3,3',4,4',5,5'-Hexachlorobiphenyl（#169） [1-7] Heptachlorobiphenyls [1-7-1] 2,2',3,3',4,4',5-Heptachlorobiphenyl（#170） [1-7-2] 2,2',3,4,4',5,5'-Heptachlorobiphenyl（#180） [1-7-3] 2,3,3',4,4',5,5'-Heptachlorobiphenyl（#189） [1-8] Octachlorobiphenyls [1-9] Nonachlorobiphenyls [1-10] Decachlorobiphenyl	○	○	○	○
[2]	Hexachlorobenzene	○	○	○	○
[3]	Aldrin	○	○	○	○
[4]	Dieldrin	○	○	○	○
[5]	Endrin	○	○	○	○

Target chemicals		Monitored media			
No	Name	Surface water	Sediment	Wildlife	Air
[6]	DDTs [6-1] *p,p'*-DDT [6-2] *p,p'*-DDE [6-3] *p,p'*-DDD [6-4] *o,p'*-DDT [6-5] *o,p'*-DDE [6-6] *o,p'*-DDD	○	○	○	○
[7]	Chlordanes [7-1] *cis*-Chlordane [7-2] *trans*-Chlordane [7-3] Oxychlordane [7-4] *cis*-Nonachlor [7-5] *trans*-Nonachlor	○	○	○	○
[8]	Heptachlors [8-1] Heptachlor [8-2] *cis*-Heptachlor epoxide [8-3] *trans*-Heptachlor epoxide	○	○	○	○
[9]	Toxaphenes [9-1] 2-endo,3-exo,5-endo,6-exo,8,8,10,10-octachlorobornane (Parlar-26) [9-2] 2-endo,3-exo,5-endo,6-exo,8,8,9,10,10-nonachlorobornane (Parlar-50) [9-3] 2,2,5,5,8,9,9,10,10-Nonachlorobornane (Parlar-62)	○	○	○	○
[10]	Mirex	○	○	○	○
[11]	HCH (Hexachlorohexanes) [11-1] *α*-HCH [11-2] *β*-HCH [11-3] *γ*-HCH [11-4] *δ*-HCH	○	○	○	○
[12]	Acrylamide	○	○	○	
[13]	Trichlorobenzenes [13-1] 1,2,3- Trichlorobenzene [13-2] 1,2,4- Trichlorobenzene [13-3] 1,3,5- Trichlorobenzene				○
[14]	Tetrachlorobenzenes [14-1] 1,2,3,4- Tetrachlorobenzene [14-2] 1,2,3,5- Tetrachlorobenzene [14-3] 1,2,4,5- Tetrachlorobenzene				○
[15]	Pentachlorobenzene	○	○	○	○
[16]	Tetrabromobisphenol A	○	○	○	
[17]	Hexachlorobuta-1,3-diene	○	○	○	
[18]	Hexabromobenzene	○	○	○	

Chemical and physical properties of target chemicals of the Environmental Monitoring are as follows.

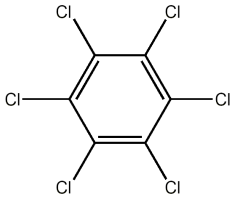
[1] Polychlorinated biphenyls (PCBs)



i = m+n =1～10

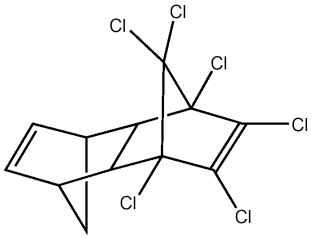
Molecular formula: $C_{12}H_{(10-i)}Cl_i$ （i = m+n =1～10）
CAS: 1336-36-3
ENCS: Not identified
MW: 291.98～360.86
mp: 340～375℃[1)]
bp: Uncertain
SW: Almost insoluble[2)]
Specific gravity: 1.44 (30℃)[1)]
logPow: 3.76～8.26 (25℃)[3)]

[2] Hexachlorobenzene



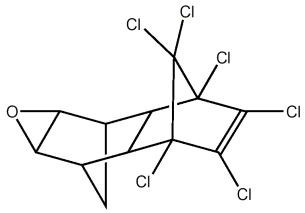
Molecular formula: C_6Cl_6
CAS: 118-74-1
ENCS: 3-0076
MW: 284.78
mp: 231.8℃[4)]
bp: 325℃[4)]
SW: 0.0047mg/L (25℃)[5)]
Specific gravity: 2.04 (23℃)[4)]
logPow: 5.73[6)]

[3] Aldrin



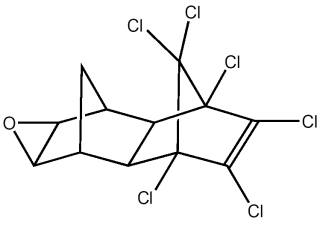
Molecular formula: $C_{12}H_8Cl_6$
CAS: 309-00-2
ENCS: 4-0303
MW: 364.91
mp: 104℃[7)]
bp: 145℃ (2mmHg)[8)]
SW: 170mg/L (25℃)[5)]
Specific gravity: 1.6 (20℃)[9)]
logPow: 6.50[6)]

[4] Dieldrin



Molecular formula: $C_{12}H_8Cl_6O$
CAS: 60-57-1
ENCS: 4-0299
MW: 380.91
mp: 175.5℃[4)]
bp: Uncertain
SW: 0.195mg/L (25℃)[1)]
Specific gravity: 1.75[10)]
logPow: 5.40[6)]

[5] Endrin

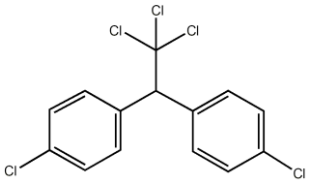


Molecular formula: $C_{12}H_8Cl_6O$
CAS: 72-20-8
ENCS: 4-0299
MW: 380.91
mp: 200℃[11)]
bp: 245℃ (decomposition)[7)]
SW: 0.25mg/L[10)]
Specific gravity: 1.7[12)]
logPow: 5.20[6)]

(Abbreviations) CAS: CAS registry number, ENCS: registry number in the Existing and New Chemical Substances List, MW: molecular weight, mp: melting point, bp: boiling point, SW: solubility in water, logPow: *n*-octanol-water partition coefficient.

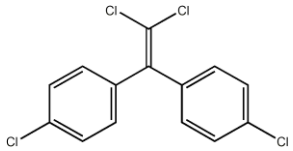
[6] DDTs

[6-1] *p,p'*-DDT



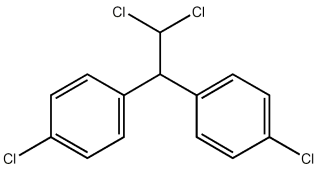
Molecular formula: $C_{14}H_9Cl_5$
CAS: 50-29-3
ENCS: 4-0910
MW: 354.49
mp: 108.5℃[4)]
bp: 260℃[4)]
SW: 0.0055mg/L (25℃)[5)]
Specific gravity: 0.98～0.99[13)]
logPow: 6.91[6)]

[6-2] *p,p'*-DDE



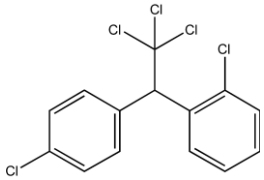
Molecular formula: $C_{14}H_8Cl_4$
CAS: 72-55-9
ENCS: Not identified
MW: 318.03
mp: 89℃[4)]
bp: Uncertain
SW: 0.04mg/L (25℃)[5)],
0.065mg/L (24℃)[14)]
Specific gravity: Uncertain
logPow: 6.51[6)]

[6-3] *p,p'*-DDD



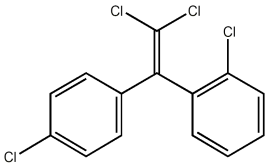
Molecular formula: $C_{14}H_{10}Cl_4$
CAS: 72-54-8
ENCS: Not identified
MW: 320.04
mp: 109～110℃[7)]
bp: 193℃ (1mmHg)[4)]
SW: 0.16mg/L[14)]
Specific gravity: 1.385[4)]
logPow: 6.02[6)]

[6-4] *o,p'*-DDT



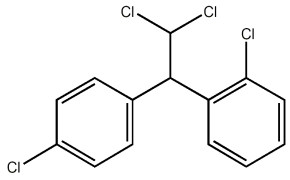
Molecular formula: $C_{14}H_9Cl_5$
CAS: 789-02-6
ENCS: Not identified
MW: 354.49
mp: Uncertain
bp: Uncertain
SW: Uncertain
Specific gravity: Uncertain
logPow: Uncertain

[6-5] *o,p'*-DDE



Molecular formula: $C_{14}H_8Cl_4$
CAS: 3424-82-6
ENCS: Not identified
MW: 318.03
mp: Uncertain
bp: Uncertain
SW: Uncertain
Specific gravity: Uncertain
logPow: Uncertain

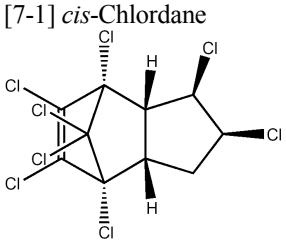
[6-6] *o,p'*-DDD



Molecular formula: $C_{14}H_{10}Cl_4$
CAS: 53-19-0
ENCS: Not identified
MW: 320.04
mp: Uncertain
bp: Uncertain
SW: Uncertain
Specific gravity: Uncertain
logPow: Uncertain

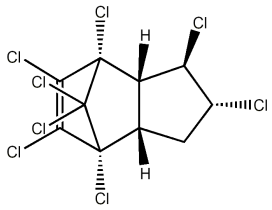
[7] Chlordanes

[7-1] *cis*-Chlordane



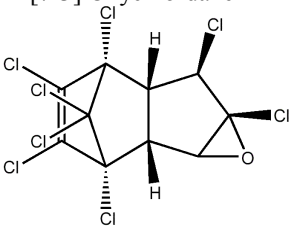
Molecular formula: $C_{10}H_6Cl_8$
CAS: 5103-71-9
ENCS: 4-637
MW: 409.78
mp: 106～107℃[2)]
bp: 175℃ (1mmHg)[2)]
SW: Insoluble[7)]
Specific gravity: 1.59～1.63 (25℃)[7)]
logPow: 6.16[6)]

[7-2] *trans*-Chlordane



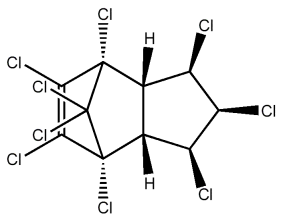
Molecular formula: $C_{10}H_6Cl_8$
CAS: 5103-74-2
ENCS: 4-637
MW: 409.78
mp: 104～105℃[2)]
bp: 175℃ (1mmHg)[2)]
SW: Insoluble[7)]
Specific gravity: 1.59～1.63 (25℃)[7)]
logPow: 6.16[6)]

[7-3] Oxychlordane



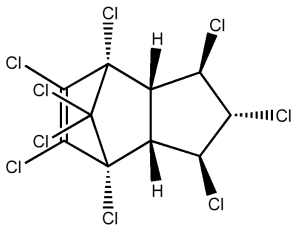
Molecular formula: $C_{10}H_4Cl_8O$
CAS: 26880-48-8
ENCS: Not identified
MW: 423.76
mp: 98～101℃[7)]
bp: Uncertain
SW: Insoluble[7)]
Specific gravity: Uncertain
logPow: 4.76[6)]

[7-4] *cis*-Nonachlor



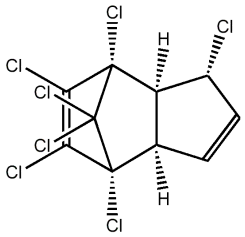
Molecular formula: $C_{10}H_5Cl_9$
CAS: 5103-73-1
ENCS: Not identified
MW: 444.23
mp: 214～215℃[7)]
bp: Uncertain
SW: 0.057mg/L[7)]
Specific gravity: Uncertain
logPow: 5.21[6)]

[7-5] *trans*-Nonachlor



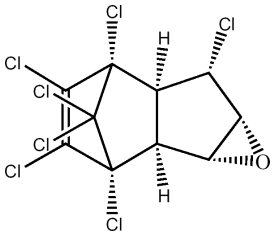
Molecular formula: $C_{10}H_5Cl_9$
CAS: 39765-80-5
ENCS: Not identified
MW: 444.23
mp: 128～130℃[7)]
bp: Uncertain
SW: 0.064mg/L[7)]
Specific gravity: Uncertain
logPow: 5.08[6)]

[8] Heptachlors
[8-1] Heptachlor

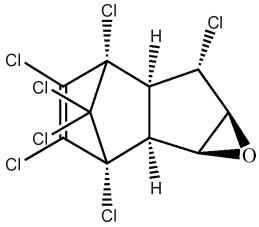


Molecular formula: $C_{10}H_5Cl_7$
CAS: 76-44-8
ENCS: 4-637, 9-1646
MW: 373.32
mp: 95～96℃[7)]
bp: 145℃ (1.5mmHg)[4)]
SW: 0.18mg/L (25℃)[10)]
Specific gravity: 1.57 (9℃)[4)]
logPow: 6.10[6)]

[8-2] *cis*-Heptachlor epoxide



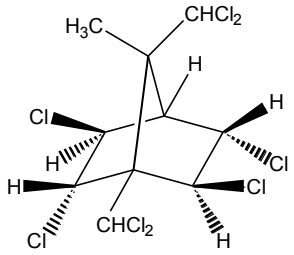
[8-3] *trans*-Heptachlor epoxide



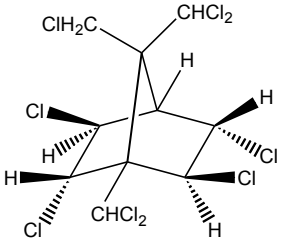
The following data are for both [8-2] and [8-3].
Molecular formula: $C_{10}H_5Cl_7O$
CAS: 1024-57-3
ENCS: Not identified
MW: 389.32
mp: 160～161.5℃[2)]
bp: Uncertain
SW: 0.275mg/L[5)]
Specific gravity: 1.58[7)]
logPow: 5.40[6)]

[9] Toxaphenes

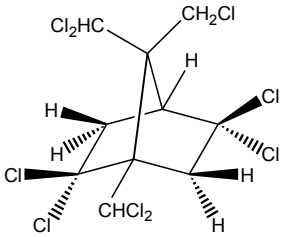
[9-1]
2-Endo,3-exo,5-endo,6-exo,8,8,10,10-octachlorobornane (Parlar-26)



[9-2]
2-Endo,3-exo,5-endo,6-exo,8,8,9,10,10-nonachlorobornane (Parlar-50)

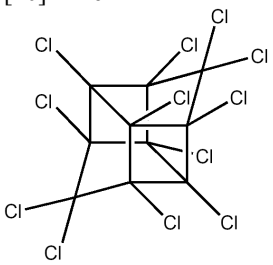


[9-3]
2,2,5,5,8,9,9,10,10-nonachlorobornane (Parlar-62)



Molecular formula: $C_{16}H_{10}Cl_8$ ([9-1]), $C_{16}H_9Cl_9$ ([9-2], [9-3])
CAS: 8001-35-2
ENCS: Not identified
MW: 409.83 ([9-1]), 443.79 ([9-2], [9-3])
The following data are for both [9-1].
mp: 65～90℃[11)]
bp: Uncertain
SW: 0.55mg/L (20℃)[15)]
Specific gravity: 1.65 (25℃)[14)]
logPow: 5.90[16)]

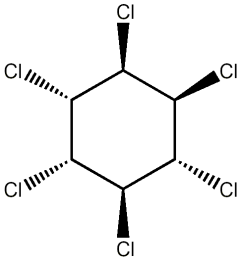
[10] Mirex



Molecular formula: $C_{10}Cl_{12}$
CAS: 2385-85-5
ENCS: Not identified
MW: 545.59
mp: 485℃[17)]
bp: Uncertain
SW: 0.20mg/L (24℃)[14)]
Specific gravity: Uncertain
logPow: 5.28[6)]

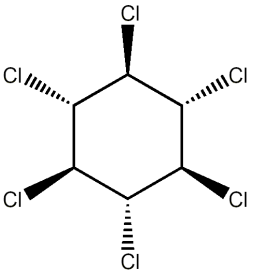
[11] HCHs (Hexachlorohexanes)

[11-1] α-HCH



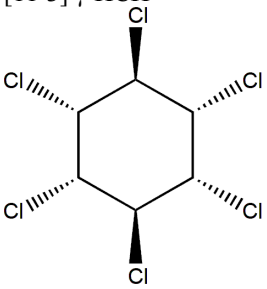
Molecular formula: $C_6H_6Cl_6$
CAS: 319-84-6
ENCS: 3-2250, 9-1652
MW: 290.83
mp: 158℃[1)]
bp: 288℃[18)]
SW: 2mg/L[2)]
Specific gravity: 1.87
(20℃)[19)]
logPow: 3.8[6)]

[11-2] *β*-HCH



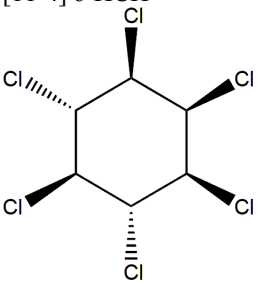
Molecular formula: $C_6H_6Cl_6$
CAS: 319-85-7
ENCS: 3-2250, 9-1652
MW: 290.83
mp: 309℃[20)]
bp: 60℃[2)]
SW: 5mg/L[2)]
Specific gravity: 1.87
(20℃)[19)]
logPow: 3.78[1)]

[11-3] γ-HCH



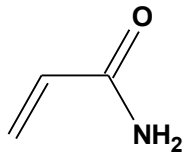
Molecular formula: $C_6H_6Cl_6$
CAS: 58-89-9
ENCS: 3-2250, 9-1652
MW: 290.83
mp: 112.5℃[7)]
bp: 323.4℃[4)]
SW: 7.3mg/L[5)]
Specific gravity: 1.85
(20℃)[19)]
logPow: 3.72[6)]

[11-4] δ-HCH



Molecular formula: $C_6H_6Cl_6$
CAS: 319-86-8
ENCS: 3-2250, 9-1652
MW: 290.83
mp: 141.5℃[4)]
bp: 60℃ (0.36mmHg)[4)]
SW: 21.3mg/L[2)]
Specific gravity: 1.87
(20℃)[19)]
logPow: 4.14[6)]

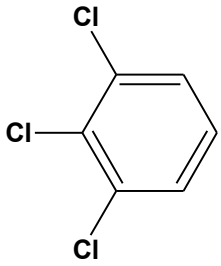
［12］ Acrylamide



Molecular formula: C_3H_5NO
CAS: 79-06-1
ENCS: 2-1014
MW: 71.08
mp: 84.5℃[7)]
bp: 87.0～125.0℃[7)]
SW: Readily soluble[7)]
Specific gravity: 1.122[7)]
logPow: -1.65[2)]

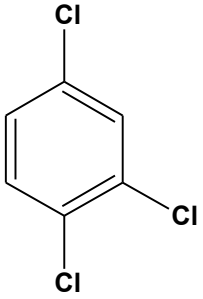
［13］ Trichlorobenzenes

［13-1］ 1,2,3- Trichlorobenzene



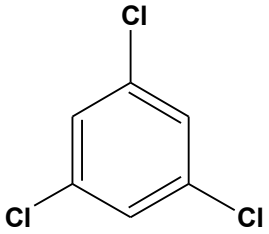
Molecular formula: $C_6H_3Cl_3$
CAS: 87-61-6
ENCS: 3-0074
MW: 181.45
mp: 53.5℃[4)]
bp: 218.5℃[4)]
sw: 18 mg/L (25℃)[5)]
Specific gravity: Uncertain
logPow: 4.05[6)]

［13-2］ 1,2,4- Trichlorobenzene



Molecular formula: $C_6H_3Cl_3$
CAS: 120-82-1
ENCS: 3-0074
MW: 181.45
mp: 17℃[4)]
bp: 213.5℃[4)]
sw: 31.3 mg/L(25℃)[5)]
Specific gravity: 1.4634 (25/25℃)[7)]
logPow: 4.02[6)]

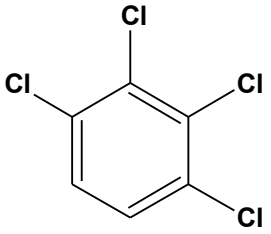
［13-3］ 1,3,5-Trichlorobenzene



Molecular formula: $C_6H_3Cl_3$
CAS: 108-70-3
ENCS: 3-0074
MW: 181.45
mp: 63.5℃[4)]
bp: 208℃[4)]
sw: 6.01 mg/L(25℃)[5)]
Specific gravity: Uncertain
logPow: 4.19[6)]

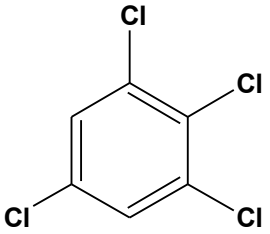
［14］Tetrachlorobenzenes

［14-1］1,2,3,4- Tetrachlorobenzene



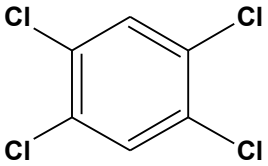
Molecular formula: $C_6H_2Cl_4$
CAS: 634-66-2
ENCS: 3-0076
MW: 215.89
mp: 47.5℃[4)]
bp: 254℃[4)]
sw: 0.0000433%(25℃)[4)]
Specific gravity: 1.858 (25/4℃)[27)]
logPow: 4.55[4)]

［14-2］1,2,3,5- Tetrachlorobenzene



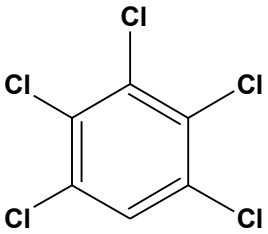
Molecular formula: $C_6H_2Cl_4$
CAS: 634-90-2
ENCS: 3-0076
MW: 215.89
mp: 54.5 ℃[4)]
bp: 246℃[4)]
sw: 0.000346%(25℃)[4)]
Specific gravity: Uncertain
logPow: 4.65[4)]

［14-3］1,2,4,5-Tetrachlorobenzene



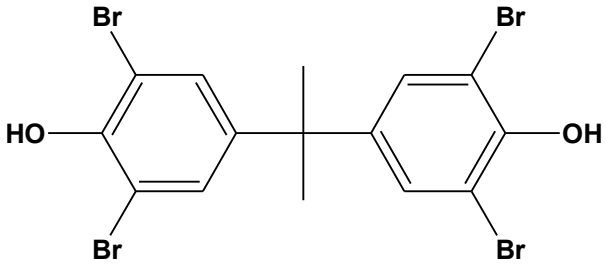
Molecular formula: $C_6H_2Cl_4$
CAS: 95-94-3
ENCS: 3-0076
MW: 215.89
mp: 139.5℃[4)]
bp: 244.5℃[4)]
sw: 0.595 mg/L(25℃)[5)]
Specific gravity: Uncertain
logPow: 4.60[6)]

［15］Pentachlorobenzene



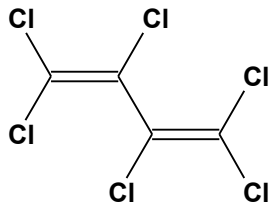
Molecular formula: C_6HCl_5
CAS: 608-93-5
ENCS: 3-0076
MW: 250.34
mp: 86℃[4)]
bp: 277℃[4)]
sw: 1.33 mg/L(25℃)[5)]
Specific gravity: Uncertain
logPow: 5.18[6)]

［16］Tetrabromobisphenol A



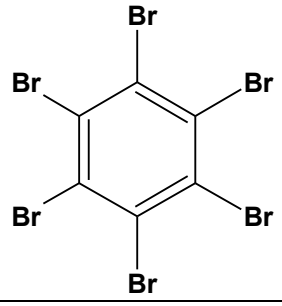
Molecular formula: $C_{15}H_{12}Br_4O_2$
CAS: 79-94-7
ENCS: 4-205
MW: 543.88
mp: 179℃[4)]
bp: 316℃[22)]
sw: 0.001002 mg/L(25 ℃)[23)]
Specific gravity: Uncertain
logPow: 7.20[24)]

［17］ Hexachlorobuta-1,3-diene



Molecular formula: C_4Cl_6
CAS: 87-68-3
ENCS: 2-121
MW: 260.76
mp: -21℃[7)]
bp: 215℃[7)]
sw: 0.0005%(20℃)[7)]
Specific gravity: 1.6820(20/4℃)[7)]
logPow: 4.9[25)]

［18］ Hexabromobenzene



Molecular formula: C_6Br_6
CAS: 87-82-1
ENCS: 3-59
MW: 551.49
mp: 327℃[4)]
bp: Uncertain
sw: 0.00016mg/L(25℃)[22)]
Specific gravity: Uncertain
logPow: 6.07[26)]

References

1) Sax, Dangerous Properties of Industrial Materials Volumes 1-3 7th edition, Van Nostrand Reinhold (1989)
2) International Agency for Research on Cancer (IARC), IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. World Health Organization (1972)
3) U.S.EPA, Ambient Water Quality Criteria Document, Polychlorinated Biphenyls (1980)
4) Lide, CRC Handbook of Chemistry and Physics 81st edition, CRC Press LLC (2004-2005)
5) Yalkowsky et al., Aquasol Database of Aqueous Solubility Version 5, College of Pharmacy, University of Arizona (1992)
6) Hansch et al., Exploring QSAR - Hydrophobic, Electronic, and Steric Constants, American Chemical Society (1995)
7) O'Neil, The Merck Index - An Encyclopedia of Chemicals, Drugs and Biologicals 13th Edition, Merck Co. Inc. (2001)
8) Hartley et al., The Agrochemical Handbook 2nd edition, The Royal Society of Chemistry (1987)
9) US Coast Guard, Department of Transportation, CHRIS - Hazardous Chemical Data Volume II, US Government Printing Office (1984-1985)
10) Biggar et al., Apparent solubility of organochlorine insecticides in water at various temperatures, Hilgardia, 42, 383-391 (1974)
11) Lewis, Hawley's Condensed Chemical Dictionary 13rd edition, John Wiley & Sons (1997)
12) U.S.EPA, Ambient Water Quality Criteria Doc, Endrin (1980)
13) Clayton et al., Patty's Industrial Hygiene and Toxicology Volumes 2A, 2B and 2C: Toxicology 3rd edition, John Wiley Sons (1981-1982)
14) Verschueren, Handbook of Environmental Data of Organic Chemicals 2nd edition, Van Nostrand Reinhold Co. (1983)
15) Murphy et al., Equilibration of polychlorinated biphenyls and toxaphene with air and water, Environmental Science and Technology, 21, 155-162 (1987)
16) Fisk et al., Octanol/water partition coefficients of toxaphene congeners determined by the "slow-stirring" method, Chemosphere, 39, 2549-2562 (1999)
17) Spencer, Guide to the Chemicals Used in Crop Protection 7th edition Publication 1093, Research Institute, Agriculture Canada, Information Canada (1982)
18) IPCS, International Chemical Safety Cards, alpha-Hexachlorocyclohexane ICSC0795
19) ATSDR, Toxicological Profile for alpha-, beta-, gamma- and delta-Hexachlorocyclohexane (2005)
20) Tomlin, The Pesticide Manual 13rd Edition, The British Crop Protection Council (2004-2005)
21) "C Log P", BioByte Corporation
22) Howard et al., Handbook of Physical Properties of Organic Chemicals, CRC Press Inc. (1997)
23) USEPA WSKOWWIN v1.40
24) USEPA KOWWIN v1.66
25) International Chemical Safety Cards ICSC0896
26) Hansch et al., Exploring QSAR - Hydrophobic, Electronic and Steric Constants, American Chemical Society (1995)
27) Platonov, V. A.; Simulin, Yu. N.; RJPCAR; Russ.J.Phys.Chem.(Engl.Transl.); EN; 59; 2; 1985; 179-181; ZFKHA9; Zh.Fiz.Khim.; RU; 59; 2; 300-304 (1985)

3. Monitored site and procedure

In the Environmental Monitoring (of surface water, sediment, wildlife, and air), the sampling of specimens was entrusted to prefectural governments and government-designated cities across Japan and the specimens sampled were analysed by private analytical laboratories.

(1) Organisations responsible for sampling

Local communities	Organisations responsible for sampling	Monitored media			
		Surface water	Sediment	Wildlife	Air
Hokkaido	Hokkaido Institute of Environmental Sciences	○	○	○	○
Sapporo City	Sapporo City Institute of Public Health				○
Aomori Pref.	Aomori Prefectural Institute of Public Health and Environment	○	○		
	Aomori Prefectural Government Sanpachi District Administration Office Management and Local Coordination Division Hachinohe Environmental Management Office			○	
Iwate Pref.	Research Institute for Environmental Sciences and Public Health of Iwate Prefecture	○	○	○	○
Miyagi Pref.	Miyagi Prefectural Institute of Public Health and Environment	○	○	○	○
Sendai City	Sendai City Institute of Public Health		○		
Akita Pref.	Akita Research Center for Public Health and Environment	○	○		
Yamagata Pref.	Environmental Science Research Center of Yamagata Prefecture	○	○		
Fukushima Pref.	Fukushima Prefectural Institute of Environmental Research	○	○		
Ibaraki Pref.	Ibaraki Kasumigaura Environmental Science Center	○	○	○	○
Tochigi Pref.	Tochigi Prefectural Institute of Public Health and Environmental Science	○	○		
Gunma Pref.	Gunma Prefectural Institute of Public Health and Environmental Sciences				○
Chiba Pref.	Chiba Prefectural Environmental Research Center		○		○
Chiba City	Chiba City Institute of Health and Environment	○	○		
Tokyo Met.	Tokyo Metropolitan Research Institute for Environmental Protection	○	○	○	○
Kanagawa Pref.	Kanagawa Environmental Research Center				○
Yokohama City	Yokohama Environmental Science Research Institute	○	○	○	○
Kawasaki City	Kawasaki Municipal Research Institute for Environmental Protection	○	○	○	
Niigata Pref.	Niigata Prefectural Institute of Public Health and Environmental Sciences	○	○		○
Toyama Pref.	Toyama Prefectural Environmental Science Research Center	○	○		○
Ishikawa Pref.	Ishikawa Prefectural Institute of Public Health and Environmental Science	○	○	○	○
Fukui Pref.	Fukui Prefectural Institute of Public Health and Environmental Science	○	○		
Yamanashi Pref.	Yamanashi Institute for Public Health		○		○
Nagano Pref.	Nagano Environmental Conservation Research Institute	○	○		○
Gifu Pref.	Gifu Prefectural Research Institute for Health and Environmental Sciences				○
Shizuoka Pref.	Shizuoka Institute of Environment and Hygiene	○	○		
Aichi Pref.	Aichi Environmental Research Center	○	○		
Nagoya City	Nagoya City Environmental Science Research Institute				○
Mie Pref.	Mie Prefectural Science and Technology Promotion Center	○	○		○
Shiga Pref.	Lake Biwa Environmental Research Institute	○	○	○	
Kyoto Pref.	Kyoto Prefectural Institute of Public Health and Environment	○	○		○
Kyoto City	Kyoto City Institute of Health and Environmental Sciences	○	○		
Osaka Pref.	Research Institute of Environment, Agriculture and Fisheries, Osaka Prefectural Government	○	○	○	○
Osaka City	Osaka City Institute of Public Health and Environmental Sciences	○	○		
Hyogo Pref.	Hyogo Prefectural Institute of Public Health and Environmental Sciences	○	○	○	○
Kobe City	Environmental Conservation and Guidance Division, Environment Bureau	○	○		○
Nara Pref.	Nara Prefectural Institute for Hygiene and Environment		○		
Wakayama Pref.	Wakayama Prefectural Research Center of Environment and Public Health	○	○		
Tottori Pref.	Tottori Prefectural Institute of Public Health and Environmental Science			○	
Shimane Pref.	Shimane Prefectural Institute of Public Health and Environmental Science			○	○
Okayama Pref.	Okayama Prefectural Institute for Environmental Science and Public Health	○	○		
Hiroshima City	Hiroshima Prefectural Technology Research Institute Health and Environment Center	○	○		
Hiroshima City	Hiroshima City Institute of Public Health			○	○
Yamaguchi Pref.	Yamaguchi Prefectural Public Health and Environment	○	○		○

Local communities	Organisations responsible for sampling	Monitored media			
		Surface water	Sediment	Wildlife	Air
Tokushima Pref.	Tokushima Prefectural Institute of Public Health and Environmental Sciences	○	○	○	○
Kagawa Pref.	Kagawa Prefectural Research Institute for Environmental Sciences and Public Health	○	○	○	○
Ehime Pref.	Ehime Prefectural Institute of Public Health and Environmental Science		○		○
Kochi Pref.	Kochi Prefectural Environmental Research Center	○	○	○	
Fukuoka Pref.	Fukuoka Institute of Health and Environmental Science				○
Kitakyushu City	Kitakyushu City Institute of Environmental Sciences	○	○	○	
Fukuoka City	Fukuoka City Institute for Hygiene and the Environment		○		
Saga Pref.	Saga Prefectural Environmental Research Center	○	○		○
Nagasaki Pref.	Public Relations and Public Hearing Division, Policy Planning and Coordination Bureau	○	○		
Kumamoto Pref.	Kumamoto Prefectural Institute of Public Health and Environmental Science	○			○
Oita Pref.	Environmental Preservation Division, Life and Environment Department		○		
Miyazaki Pref.	Miyazaki Prefectural Institute for Public Health and Environment	○	○		○
Kagoshima Pref.	Kagoshima Prefectural Institute for Environmental Research and Public Health	○	○	○	○
Okinawa Pref.	Okinawa Prefectural Institute of Health and Environment	○	○	○	○

(Note) Organisations responsible for sampling are described by their official names in FY 2007.

(2) Monitored sites (areas)

Monitored sites (areas) are shown in Figure 3-1-1 for surface water, Figure 3-1-2 for sediment, Figure 3-1-3 for wildlife, and Figure 3-1-4 for air. The breakdown is summarized as follows.

Monitored media	Numbers of local communities	Numbers of target chemicals (groups)	Numbers of monitored sites (or areas)	Numbers of samples at a monitored site (or area)
Surface water	42	16	48	1
Sediment	48	16	64	3
Wildlife (bivalves)	7	16	7	5
Wildlife (fish)	14	16	16	5
Wildlife (birds)	2	16	2	5
Air (warm season)	34	14	36	1
Air (cold season)	34	14	36	1

List of monitored sites (surface water) in the Environmental Monitoring in FY 2007

Local communities	Monitored sites	Sampling dates
Hokkaido	Suzuran-ohashi Bridge, Riv Tokachi(Obihiro City)	October 10, 2007
	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City)	October 3, 2007
Aomori Pref.	Lake Jusan	October 4, 2007
Iwate Pref.	Riv. Toyosawa(Hanamaki City)	October 24, 2007
Miyagi Pref.	Sendai Bay(Matsushima Bay)	October 1, 2007
Akita Pref.	Lake Hachiro	October 4, 2007
Yamagata Pref.	Mouth of Riv. Mogami(Sakata City)	October 25, 2007
Fukushima Pref.	Onahama Port	November 15, 2007
Ibaraki Pref.	Tonekamome-ohasi Bridge, Mouth of Riv. Tone(Kamisu City)	October 25, 2007
Tochigi Pref.	Riv. Tagawa(Utsunomiya City)	October 16, 2007
Chiba City	Mouth of Riv. Hanami(Chiba City)	November 29, 2007
Tokyo Met.	Mouth of Riv. Arakawa(Koto Ward)	October 30, 2007
	Mouth of Riv. Sumida(Minato Ward)	October 30, 2007
Yokohama City	Yokohama Port	November 19, 2007
Kawasaki City	Keihin Canal, Port of Kawasaki	November 26, 2007
Niigata Pref.	Lower Riv. Shinano(Niigata City)	October 4, 2007
Toyama Pref.	Hagiura-bashi Bridge, Mouth of Riv. Jintsu(Toyama City)	October 30, 2007
Ishikawa Pref.	Mouth of Riv. Sai(Kanazawa City)	September 13, 2007
Fukui Pref.	Mishima-bashi Bridge, Riv. Shono(Tsuruga City)	October 11, 2007
Nagano Pref.	Lake Suwa(center)	October 10, 2007
Shizuoka Pref.	Riv. Tenryu(Iwata City)	October 23, 2007
Aichi Pref.	Nagoya Port	September 27, 2007
Mie Pref.	Yokkaichi Port	October 2, 2007
Shiga Pref.	Lake Biwa(center, offshore of Karasaki)	November 20, 2007
Kyoto Pref.	Miyazu Port	October 10, 2007
Kyoto City	Miyamae-bashi Bridge, Miyamae Bridge, Riv. Katsura(Kyoto City)	October 16, 2007
Osaka Pref.	Mouth of Riv. Yamato(Sakai City)	October 2, 2007
Osaka City	Osaka Port	October 23, 2007
Hyogo Pref.	Offshore of Himeji	November 28, 2007
Kobe City	Kobe Port(center)	October 16, 2007
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa(Wakayama City)	October 31, 2007
Okayama Pref.	Offshore of Mizushima	October 2, 2007
Hiroshima Pref.	Kure Port	November 13, 2007
	Hiroshima Bay	November 13, 2007
Yamaguchi Pref.	Tokuyama Bay	September 25, 2007
	Offshore of Ube	October 15, 2007
	Offshore of Hagi	October 24, 2007
Tokushima Pref.	Mouth of Riv. Yoshino(Tokushima City)	September 26, 2007
Kagawa Pref.	Takamatsu Port	October 9, 2007
Kochi Pref.	Mouth of Riv. Shimanto(Shimanto City)	November 12, 2007
Kitakyushu City	Dokai Bay	November 20, 2007
Saga Pref.	Imari Bay	November 12, 2007
Nagasaki Pref.	Omura Bay	November 9, 2007
Kumamoto Pref.	Riv. Midori(Uto City)	November 21, 2007
Miyazaki Pref.	Mouth of Riv. Oyodo(Miyazaki City)	September 25, 2007
Kagoshima Pref.	Riv. Amori(Kirishima City)	November 13, 2007
	Gotanda-bashi Bridge, Riv. Gotanda(Ichikikushikino City)	October 23, 2007
Okinawa Pref.	Naha Port	October 30, 2007

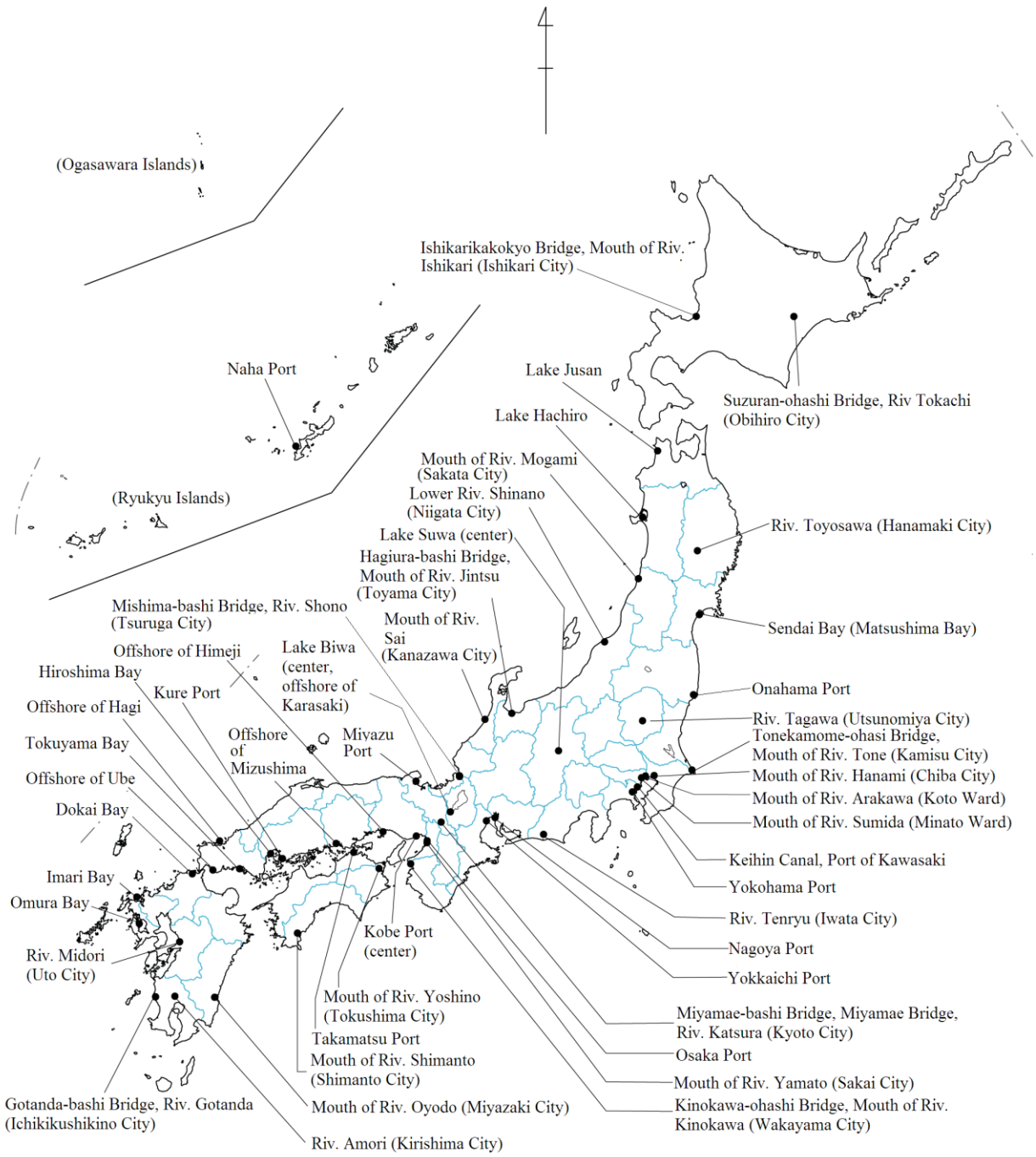


Figure 3-1-1 Monitored sites (surface water) in the Environmental Monitoring in FY 2007

List of monitored sites (sediment) in the Environmental Monitoring in FY 2007

Local communities	Monitored sites	Sampling dates
Hokkaido	Onnenai-ohashi Bridge, Riv. Teshio(Bifuka Town)	October 9, 2007
	Suzuran-ohashi Bridge, Riv Tokachi(Obihiro City)	October 11, 2007
	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City)	October 3, 2007
	Tomakomai Port	October 1, 2007
Aomori Pref.	Lake Jusan	October 4, 2007
Iwate Pref.	Riv. Toyosawa(Hanamaki City)	October 24, 2007
Miyagi Pref.	Sendai Bay(Matsushima Bay)	October 1, 2007
Sendai City	Hirose-ohashi Bridge, Riv. Hirose(Sendai City)	November 14, 2007
Akita Pref.	Lake Hachiro	October 4, 2007
Yamagata Pref.	Mouth of Riv. Mogami(Sakata City)	October 25, 2007
Fukushima Pref.	Onahama Port	November 15, 2007
Ibaraki Pref.	Tonekamome-ohasi Bridge, Mouth of Riv. Tone(Kamisu City)	October 25, 2007
Tochigi Pref.	Riv. Tagawa(Utsunomiya City)	October 16, 2007
Chiba Pref.	Coast of Ichihara and Anegasaki	October 25, 2007
Chiba City	Mouth of Riv. Hanami (Chiba City)	November 29, 2007
Tokyo Met.	Mouth of Riv. Arakawa (Koto Ward)	October 30, 2007
	Mouth of Riv. Sumida (Minato Ward)	October 30, 2007
Yokohama City	Yokohama Port	November 19, 2007
Kawasaki City	Mouth of Riv. Tama(Kawasaki City)	November 26, 2007
	Keihin Canal, Port of Kawasaki	November 26, 2007
Niigata Pref.	Lower Riv. Shinano(Niigata City)	October 4, 2007
Toyama Pref.	Hagiura-bashi Bridge, Mouth of Riv. Jintsu(Toyama City)	October 30, 2007
Ishikawa Pref.	Mouth of Riv. Sai(Kanazawa City)	September 13, 2007
Fukui Pref.	Mishima-bashi Bridge, Riv. Shono(Tsuruga City)	October 11, 2007
Yamanashi Pref.	Senshu-bashi Bridge, Riv. Arakawa(Kofu City)	November 8, 2007
Nagano Pref.	Lake Suwa(center)	October 10, 2007
Shizuoka Pref.	Shimizu Port	October 23, 2007
	Riv. Tenryu(Iwata City)	October 3, 2007
Aichi Pref.	Kinuura Port	September 27, 2007
	Nagoya Port	September 27, 2007
Mie Pref.	Yokkaichi Port	October 2, 2007
	Toba Port	October 16, 2007
Shiga Pref.	Lake Biwa(center, offshore of Minamihira)	November 20, 2007
	Lake Biwa(center, offshore of Karasaki)	November 20, 2007
Kyoto Pref.	Miyazu Port	October 10, 2007
Kyoto City	Miyamae Bridge, Miyamae Bridge, Riv. Katsura(Kyoto City)	October 16, 2007
Osaka Pref.	Mouth of Riv. Yamato(Sakai City)	October 2, 2007
Osaka City	Osaka Port	October 23, 2007
	Outside Osaka Port	October 23, 2007
	Mouth of Riv. Yodo(Osaka City)	October 23, 2007
	Riv. Yodo(Osaka City)	October 3, 2007
Hyogo Pref.	Offshore of Himeji	November 28, 2007
Kobe City	Kobe Port(center)	October 16, 2007
Nara Pref.	Riv. Yamato(Ooji Town)	October 10, 2007
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa(Wakayama City)	October 31, 2007
Okayama Pref.	Offshore of Mizushima	October 2, 2007
Hiroshima Pref.	Kure Port	November 13, 2007
	Hiroshima Bay	November 13, 2007
Yamaguchi Pref.	Tokuyama Bay	September 25, 2007
	Offshore of Ube	October 15, 2007
	Offshore of Hagi	October 24, 2007
Tokushima Pref.	Mouth of Riv. Yoshino(Tokushima City)	September 26, 2007
Kagawa Pref.	Takamatsu Port	October 9, 2007
Ehime Pref.	Niihama Port	October 25, 2007
Kochi Pref.	Mouth of Riv. Shimanto(Shimanto City)	November 12, 2007
Kitakyushu City	Dokai Bay	November 20, 2007
Fukuoka City	Hakata Bay	October 24, 2007
Saga Pref.	Imari Bay	November 12, 2007
Nagasaki Pref.	Omura Bay	November 9, 2007
Oita Pref.	Mouth of Riv. Oita(Oita City)	December 19, 2007

Local communities	Monitored sites	Sampling dates
Miyazaki Pref.	Mouth of Riv. Oyodo(Miyazaki City)	September 25, 2007
Kagoshima Pref.	Riv. Amori(Kirishima City)	November 13, 2007
	Gotanda-bashi Bridge, Riv. Gotanda (Ichikikushikino City)	October 23, 2007
Okinawa Pref.	Naha Port	October 30, 2007

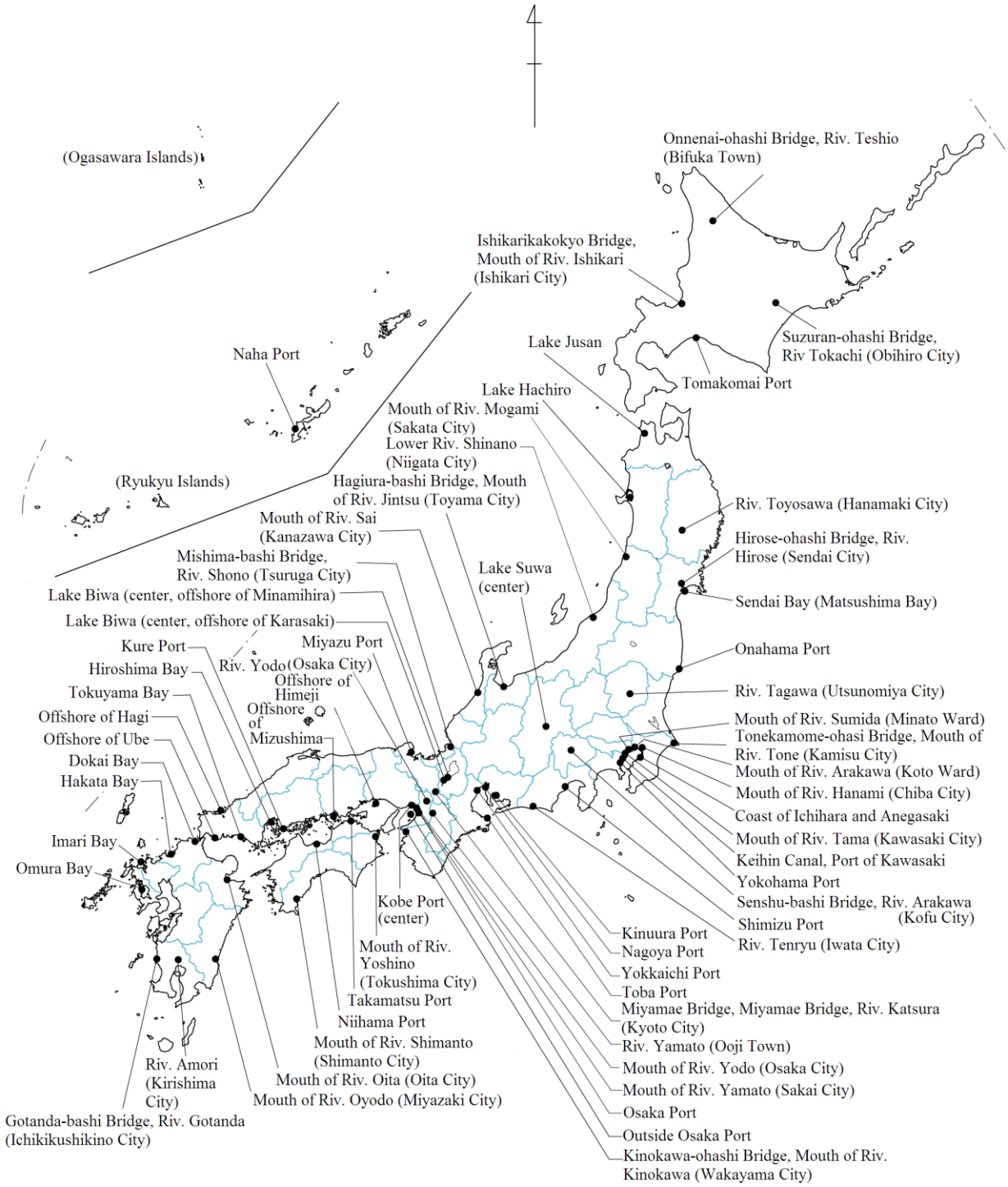


Figure 3-1-2 Monitored sites (sediment) in the Environmental Monitoring in FY 2007

List of monitored areas (wildlife) in the Environmental Monitoring in FY 2007

Local communities	Monitored sites	Sampling dates	Wildlife species	
Hokkaido	Offshore of Kushiro	November 20, 2007 November 20, 2007	Fish Fish	Rock greenling*(Hexagrammos otakki)* Chum salmon *(Oncorhynchus keta)*
	Offshore of Japan Sea(offshore of Iwanai)	October 17, 2007	Fish	Greenling *(Hexagrammos lagocephalus)*
Aomori Pref.	Kabu Is(Hachinohe City)	July 2～11, 2007	Birds	Black-taild gull *(Larus crassirostris)*
Iwate Pref.	Yamada Bay	November 30, 2007 November 25, 2007	Bivalves Fish	Blue mussel*(Mytilus galloprovincialis)* Greenling *(Hexagrammos lagocephalus)*
	Suburb of Morioka City	October 14, 2007	Birds	Gray starling *(Sturnus cineraceus)*
Miyagi Pref.	Sendai Bay(Matsushima Bay)	October 19, 2007	Fish	Sea bass *(Lateolabrax japonicus)*
Ibaraki Pref.	Offshore of Joban	November 2, 2007	Fish	Pacific saury *(Cololabis saira)*
Tokyo Met.	Tokyo Bay	August 28, 2007	Fish	Sea bass (Lateolabrax japonicus)
Yokohama City	Yokohama Port	November 22, 2007	Bivalves	Blue mussel*(Mytilus galloprovincialis)*
Kawasaki City	Offshore of Ogishima Island, Port of Kawasaki	October 9, 2007	Fish	Sea bass *(Lateolabrax japonicus)*
Ishikawa Pref.	Coast of Noto Peninsula	October 4, 2007	Bivalves	Blue mussel(Mytilus galloprovincialis)
Shiga Pref.	Lake Biwa, Riv. Azumi (Takashima City)	April 10, 2007	Fish	Dace *(Tribolodon hakonensis)*
Osaka Pref.	Osaka Bay	August 1, 2007 August 5, 2007	Fish	Sea bass *(Lateolabrax japonicus)*
Hyogo Pref.	Offshore of Himeji	November 20, 2007	Fish	Sea bass *(Lateolabrax japonicus)*
Tottori Pref.	Nakaumi	November 9, 2007	Fish	Sea bass *(Lateolabrax japonicus)*
Shimane Pref.	Shichirui Bay, Shimane Peninsula	September 9, 2007	Bivalves	Blue mussel*(Mytilus galloprovincialis)*
Hiroshima City	Hiroshima Bay	October 31, 2007	Fish	Sea bass *(Lateolabrax japonicus)*
Tokushima Pref.	Naruto	October 2, 2007	Bivalves	Hard-shelled mussel *(Mytilus coruscus)*
Kagawa Pref.	Takamatsu Port	October 2, 2007	Bivalves	Hard-shelled mussel *(Mytilus coruscus)*
Kochi Pref.	Mouth of Riv. Shimanto (Shimanto City)	November 27, 2007	Fish	Sea bass *(Lateolabrax japonicus)*
Kitakyushu City	Dokai Bay	July 31, 2007	Bivalves	Blue mussel*(Mytilus galloprovincialis)*
Kagoshima Pref.	West Coast of Satsuma Peninsula	December 19, 2007 December 25, 2007	Fish	Sea bass *(Lateolabrax japonicus)*
Okinawa Pref.	Nakagusuku Bay	January 4, 2008 January 11, 2008	Fish	Okinawa seabream*(Acanthopagrus sivicolus)*

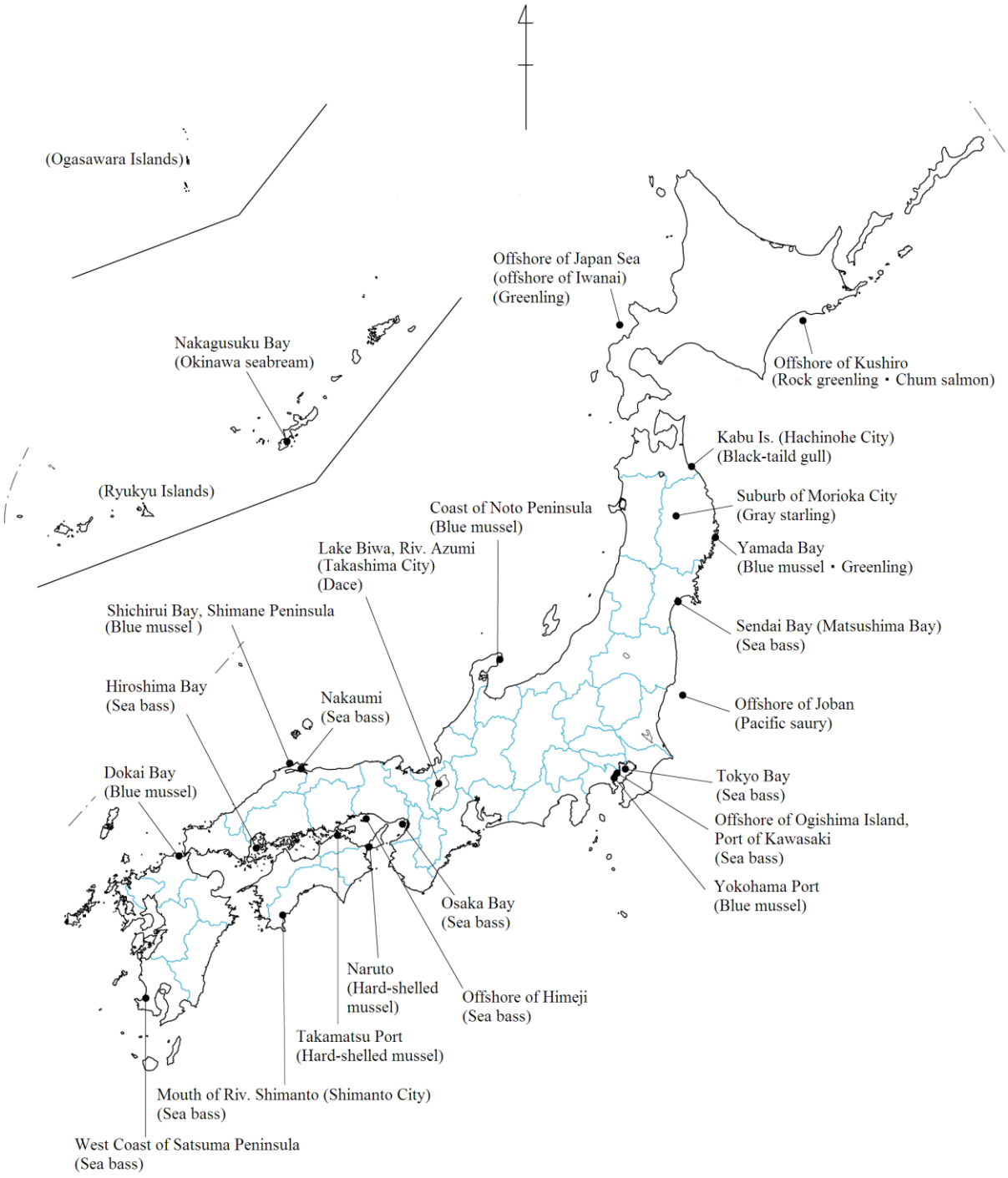


Figure 3-1-3 Monitored areas (wildlife) in the Environmental Monitoring in FY 2007

List of monitored sites (air) in the Environmental Monitoring in FY 2007

Local communities	Monitored sites	Sampling dates (Warm season)	Sampling dates (Cold season)
Hokkaido	Kamikawa Health and Welfare Office (Nayoro City)	September 11～14, 2007	November 13～16, 2007
Sapporo City	Sapporo Art Park(Sapporo City)	September 25～28, 2007	November 27～30, 2007 December 20～21, 2007
Iwate Pref.	Amihari Ski Area(Shizukuishi Town)	September 10～13, 2007	October 30～November 2, 2007
Miyagi Pref.	Miyagi Prefectural Institute of Public Health and Environment(Sendai City)	September 4～11, 2007	November 29～December 6, 2007
Ibaraki Pref.	Ibaraki Kasumigaura Environmental Science Center(Tsuchiura City)	September 13～20, 2007	November 7～14, 2007
Gunma Pref.	Gunma Prefectural Institute of Public Health and Environmental Sciences(Maebashi City)	September 7～14, 2007	November 13～20, 2007
Chiba Pref.	Ichihara-Matsuzaki Air Quality Monitoring Station(Ichihara City)	September 18～21, 2007	November 19～22, 2007
Tokyo Met.	Tokyo Metropolitan Research Institute for Environmental Protection(Koto Ward)	October 3～12, 2007	November 30～December 7, 2007
	Chichijima Island	September 22～29, 2007	November 15～23, 2007
Kanagawa Pref.	Kanagawa Environmental Research Center(Hiratsuka City)	September 11～14, 2007	December 10～13, 2007
Yokohama City	Yokohama Environmental Science Research Institute(Yokohama City)	September 11～18, 2007	November 13～20, 2007 November 26～29, 2007
Niigata Pref.	Oyama Air Quality Monitoring Station(Niigata City)	September 25～28, 2007	December 3～6, 2007
Toyama Pref.	Tonami Air Quality Monitoring Station(Tonami City)	September 18～21, 2007	December 3～6, 2007
Ishikawa Pref.	Ishikawa Prefectural Institute of Public Health and Environmental Science(Kanazawa City)	September 4～7, 2007	November 6～9, 2007
Yamanashi Pref.	Fujiyoshida Joint Prefectural GovernmentBuilding(Fujiyoshida City)	September 18～21, 2007	December 3～6, 2007
Nagano Pref.	Nagano Environmental Conservation Research Institute(Nagano City)	September 18～25, 2007	November 26～December 3, 2007
Gifu Pref.	Gifu Prefectural Research Institute for Health and Environmental Sciences(Kakamigahara City)	September 25～28, 2007	November 19～22, 2007
Nagoya City	Chikusa Ward Heiwa Park(Nagoya City)	September 18～25, 2007	December 3～10, 2007 January 15～18, 2008
Mie Pref.	Mie Prefectural Science and TechnologyPromotion Center(Yokkaichi City)	September 10～13, 2007	December 17～20, 2007
Kyoto Pref.	Kyoto Prefecture Joyo Senior High School(Joyo City)	September 11～14, 2007	December 10～13, 2007
Osaka Pref.	Research Institute of Environment, Agriculture and Fisheries, Osaka Prefectural Government(Osaka City)	October 9～12, 2007	December 17～20, 2007 January 9～11, 2008
Hyogo Pref.	Hyogo Prefectural Institute of Public Health and Environmental Sciences(Kobe City)	September 19～22, 2007	December 5～8, 2007
Kobe City	Fukiai Air Quality Monitoring Station(Kobe City)	September 10～13, 2007	December 5～8, 2007
Shimane Pref.	Oki National Acid Rain Observatory(Okinoshima Town)	September 25～28, 2007	November 27～30, 2007
Hiroshima City	Hiroshima City Kokutaiji Junior High School(Hiroshima City)	September 25～28, 2007	November 19～22, 2007
Yamaguchi Pref.	Yamaguchi Prefectural Public Health and Environment(Yamaguchi City)	September 18～25, 2007	November 27～December 4, 2007
	Hagi City Government Building, Mishima Branch(Hagi City)	September 14～21, 2007	November 27～December 4, 2007
Tokushima Pref.	Tokushima Prefectural Institute of Public Health and Environmental Sciences(Tokushima City)	September 18～21, 2007	December 10～13, 2007
Kagawa Pref.	Takamatsu Joint Prefectural Government Building(Takamatsu City) Kagawa Prefectural Public Swimming Pool(Takamatsu City) as a reference site	September 26～October 3, 2007	November 14～21, 2007
Ehime Pref.	Ehime Prefecture Government Building, Uwajima Branch(Uwajima City)	September 18～21, 2007	November 12～15, 2007
Fukuoka Pref.	Omuta City Government Building(Omuta City)	October 1～4, 2007	December 3～7, 2007
Saga Pref.	Saga Prefectural Environmental Research Center(Saga City)	September 10～17, 2007	November 12～19, 2007
Kumamoto Pref.	Kumamoto Prefectural Institute of Public Health and Environmental Science(Udo City)	September 25～28, 2007	November 12～15, 2007
Miyazaki Pref.	Miyazaki Prefectural Institute for Public Healthand Environment(Miyazaki City)	September 11～18, 2007	December 3～10, 2007

Local communities	Monitored sites	Sampling dates (Warm season)	Sampling dates (Cold season)
Kagoshima Pref.	Kagoshima Prefectural Institute forEnvironmental Research and Public Health(Kagoshima City)	September 25～28, 2007	November 26～29, 2007
Okinawa Pref.	Cape Hedo(Kunigami Village)	September 18～21, 2007	November 5～8, 2007

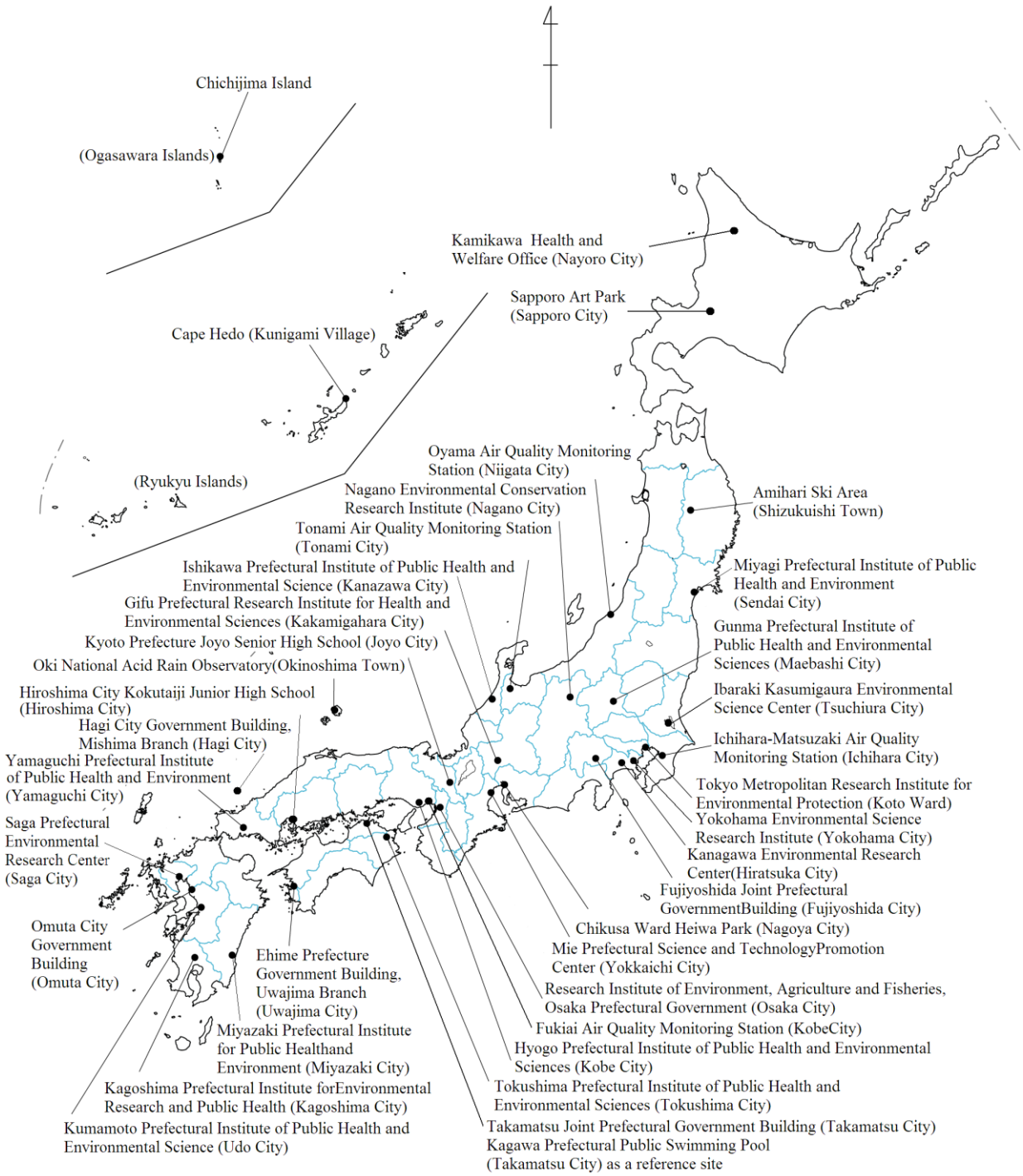


Figure 3-1-4 Monitored sites (air) in the Environmental Monitoring in FY 2007

(3) Target species

The species to be monitored among the wildlife media were selected considering the possibility of international comparison, as well as their significance and practicality as indicators: 2 bivalves (predominantly blue mussel), 7 fishes (predominantly sea bass), and 2 birds, namely, 11 species in total.

The properties of the species determined as targets in the FY 2007 monitoring are shown in Table 3-1. Moreover, Table 3-2 summarizes the outline of the samples used for analysis. Here, in the case of the black-tailed gull, prefledged juveniles (sacrificed) were used as samples.

(4) Sampling method of specimens

The sampling of specimens and the preparation of samples were carried out following the "Environmental Monitoring Instruction Manual" (No. 040309001, published on March 9th, 2004) by the Environment Health and Safety Division, Environmental Health Department, Ministry of the Environment of Japan (MOE).

Table 3-1 Properties of target species

	Species	Properties	Monitored areas	Aim of monitoring	Notes
Bibalves	Blue mussel (*Mytilus galloprovincialis*)	① Distributed worldwide, excluding tropical zones ② Adheres to rocks in inner bays and to bridge piers	・Yamada Bay ・Yokohama Port ・Coast of Noto Peninsula ・Shitirui Bay ・Dokai Bay	Follow-up of the environmental fate and persistency in specific areas	Monitored in the 5 areas with different levels of persistency
	Hard-shelled mussel (*Mytilus coruscus*)	① Distributed in various areas of southern Hokkaido and southward ② Adheres to rocks where the current is fast (1-10 m/s)	・Naruto ・Takamatsu Port	Follow-up of the environmental fate and persistency in specific areas	
Fish	Greenling (*Hexagrammos lagocephalus*)	① Distributed from Hokkaido to southern Japan, the Korean Peninsula, and China ② Lives in shallow seas of 5-50 m depth from sea level	・Offshore of Iwanai ・Yamada Bay	Follow-up of the environmental fate and persistency in specific areas	
	Rock greenling (*Hexagrammos otakki*)	① Lives in cold-current areas of Hidaka and eastward (Hokkaido) ② Larger than the greenling and eats fish smaller than its mouth size at the sea bottom	・Offshore of Kushiro	Follow-up of the environmental fate and persistency in specific areas	
	Pacific saury (*Cololabis saira*)	① Distributed widely in northern Pacific Ocean ② Migrates around Japanese Archipelago; in Chishima in autumn and northern Kyushu in winter ③ Bioaccumulation of chemicals is said to be moderate	・Offshore of Joban	Follow-up of the environmental fate and persistency around the Japanese archipelago	
	Chum salmon (*Oncorhynchus keta*)	① Distributed in northern Pacific Ocean, Sea of Japan, Bering Sea, Sea of Okhotsk, the whole of the Gulf of Alaska, and part of the Arctic Ocean ② Runs the Tone River on the Pacific Ocean side and rivers in Yamaguchi Prefecture and northward on the Sea of Japan side in Japan ③ Bioaccumulation of chemicals is said to be moderate	・Offshore of Kushiro	Follow-up of the environmental fate and persistency on a global scale	
	Sea bass (*Lateolabrax japonicus*)	① Distributed around the shores of various areas in Japan, the Korean Peninsula, and the coastal areas of China ② Sometimes lives in a freshwater environment and brackish-water regions during its life cycle ③ Bioaccumulation of chemicals is said to be high	・Matsushima Bay ・Tokyo Bay ・Kawasaki Port ・Osaka Bay ・Offshore of Himeji ・Nakaumi ・Hiroshima Bay ・Mouth of Riv. Shimanto ・West Coast of Satsuma Peninsula	Follow-up of the environmental fate and persistency in specific areas	Monitored in the 9 areas with different levels of persistency
	Okinawa seabeam (*Acanthopagrus sivicolus*)	① Distributed around Nansei Shoto (Ryukyu Islands) ② Lives in coral reefs and in bays into which rivers flow	・Kanagusuku Bay	Follow-up of the environmental fate and persistency in specific areas	
	Dace (*Tribolodon hakonensis*)	① Distributed widely in freshwater environments throughout Japan ② Preys mainly on insects	・Lake Biwa, Riv. Azumi (Takashima City)	Follow-up of the environmental fate and persistency in specific areas	
Birds	Gray starling (*Sturnus cineraceus*)	① Distributed widely in the Far East (Related species are distributed worldwide) ② Eats primarily insects	・Morioka City	Follow-up of the environmental fate and persistency in northern Japan	

Species		Properties	Monitored areas	Aim of monitoring	Notes
	Black-taild gull (*Larus crassirostris*)	① Breeds mainly in the sea off Japan ② Breeds in groups at shore reefs and in grassy fields	・Kabu Is. (Hachinohe City)	Follow-up of the environmental fate and persistency in specific areas	

Table 3-2-1 Basic data of specimens (bivalves as wildlife) in the Environmental Monitoring in FY 2007

Bivalve species (Area)	No.	Sampling month	Sex	Number of animals	Weight (g) (Average)	Length (cm) (Average)	Water content %	Lipid content %
Blue mussel *Mytilus galloprovincialis* (Yamada Bay)	1	November, 2007	Uncertain	84	33.4 ～ 83.7 (53.2)	8.4 ～ 9.7 (9.0)	82.2	1.6
	2		Uncertain	111	32.5 ～ 56.4 (42.1)	7.8 ～ 8.3 (8.1)	81.6	1.7
	3		Uncertain	175	27.0 ～ 43.4 (35.4)	7.4 ～ 7.8 (7.6)	81.8	1.7
	4		Uncertain	323	20.9 ～ 34.5 (28.0)	6.7 ～ 7.3 (7.0)	81.1	1.7
	5		Uncertain	504	13.1 ～ 26.8 (19.5)	5.8 ～ 6.6 (6.2)	82.3	1.6
Blue mussel *Mytilus galloprovincialis* (Yokohama Port)	1	November, 2007	Uncertain	286	3.0 ～ 11.0 (6.0)	3.2 ～ 4.8 (3.8)	90.7	1.0
	2		Uncertain	342	3.0 ～ 9.9 (5.3)	3.0 ～ 5.0 (3.7)	90.7	1.0
	3		Uncertain	292	2.8 ～ 13.2 (6.0)	3.1 ～ 5.0 (3.8)	91.0	1.1
	4		Uncertain	275	3.2 ～ 13.4 (6.6)	3.0 ～ 5.0 (3.9)	90.8	1.1
	5		Uncertain	263	3.3 ～ 13.7 (7.0)	3.0 ～ 5.3 (3.9)	91.6	1.0
Blue mussel *Mytilus galloprovincialis* (Coast of Noto Peninsula)	1	October, 2006	Uncertain	199	38.0 ～ 95.4 (64.9)	7.8 ～ 10.4 (9.1)	68.8	3.5
	2		Uncertain	281	21.7 ～ 45.1 (32.5)	6.5 ～ 7.7 (7.2)	63.4	3.3
	3		Uncertain	303	14.8 ～ 41.4 (24.2)	5.7 ～ 7.4 (6.5)	66.5	2.9
	4		Uncertain	322	10.5 ～ 26.3 (15.9)	4.6 ～ 6.3 (5.5)	66.1	2.7
	5		Uncertain	406	6.2 ～ 14.0 (10.4)	4.0 ～ 5.7 (4.7)	69.6	2.4
Blue mussel *Mytilus galloprovincialis* (Shitirui Bay)	1	September, 2007	Uncertain	170	27.4 ～ 59.4 (44.1)	7.9 ～ 9.1 (8.3)	74.6	2.5
	2		Uncertain	195	18.6 ～ 44.5 (30.8)	6.9 ～ 7.9 (7.4)	73.4	2.5
	3		Uncertain	250	15.1 ～ 26.5 (19.6)	5.7 ～ 7.0 (6.4)	73.8	2.3
	4		Uncertain	300	9.3 ～ 20.1 (14.5)	5.1 ～ 5.9 (5.6)	74.6	2.3
	5		Uncertain	370	5.1 ～ 12.4 (9.4)	4.3 ～ 5.2 (4.7)	74.7	2.1
Hard-shelled mussel *Mytilus coruscus* (Naruto)	1	October, 2007	Mixed	18	476.8 ～ 883.3 (665)	15 ～ 20.5 (17)	69	1.2
	2		Mixed	18	361.4 ～ 957.5 (669)	12.5 ～ 19.5 (17)	75	1.2
	3		Mixed	19	351.5 ～ 937.2 (643)	14.5 ～ 19 (17)	75	1.3
	4		Mixed	19	392.6 ～ 746.3 (574)	16 ～ 20 (18)	71	1.2
	5		Mixed	18	291.7 ～ 777.2 (496)	13 ～ 18.5 (16)	73	1.3
Hard-shelled mussel *Mytilus coruscus* (Takamatsu Port)	1	October, 2007	Uncertain	210	20.3 ～ 102.0 (54.0)	6.2 ～ 9.3 (7.6)	78.60	2.15
	2		Uncertain	225	28.6 ～ 75.5 (46.1)	6.1 ～ 8.7 (7.3)	73.66	2.09
	3		Uncertain	185	26.0 ～ 71.1 (43.0)	6.0 ～ 8.5 (7.1)	78.36	1.89
	4		Uncertain	205	29.4 ～ 77.9 (41.2)	6.2 ～ 8.9 (7.1)	73.60	2.13
	5		Uncertain	190	36.1 ～ 96.5 (59.7)	7.3 ～ 9.7 (8.2)	72.13	2.06
Blue mussel *Mytilus galloprovincialis* (Dokai Bay)	1	July, 2007	Mixed	200	5.5 ～ 10.7 (8.0)	3.8 ～ 5.2 (4.4)	69.6	3.0

Table 3-2-2 Basic data of specimens (fish as wildlife) in the Environmental Monitoring in FY 2007

Fish species (Area)	No.	Sampling month	Sex	Number of animals	Weight (g) (Average)	Length (cm) (Average)	Water content %	Lipid content %
Rock greenling *Hexagrammos otakki* (Offshore of Kushiro)	1	November, 2007	Mixed	4	630 ～ 835 (713)	36.0 ～ 40.0 (37.5)	78.0	1.1
	2		Female	5	555 ～ 780 (708)	35.0 ～ 39.5 (37.9)	78.1	0.8
	3		Mixed	5	680 ～ 800 (729)	37.0 ～ 39.5 (38.3)	78.0	1.4
	4		Uncertain	5	580 ～ 650 (615)	35.0 ～ 36.0 (35.4)	78.3	0.8
	5		Uncertain	6	580 ～ 645 (617)	35.0 ～ 37.0 (35.6)	78.9	1.1
Greenling *Hexagrammos lagocephalus* (Offshore of Iwanai)	1	October, 2007	Mixed	6	400 ～ 480 (443)	30.5 ～ 33.0 (32.0)	72.3	2.0
	2		Mixed	4	540 ～ 740 (476)	34.5 ～ 36.5 (35.5)	72.5	1.5
	3		Mixed	5	480 ～ 580 (524)	32.0 ～ 35.0 (33.4)	70.8	1.8
	4		Mixed	5	420 ～ 540 (486)	32.0 ～ 35.5 (33.4)	72.1	1.6
	5		Mixed	6	420 ～ 530 (459)	30.5 ～ 34.0 (32.2)	72.0	3.6
Chum salmon *Oncorhynchus keta* (Offshore of Kushiro)	1	November, 2007	Female	1	3,660	63.0	71.2	1.0
	2		Male	1	4,540	70.0	71.2	2.9
	3		Male	1	4,100	69.0	70.1	1.3
	4		Male	1	4,080	67.0	71.0	1.1
	5		Female	1	3,880	67.0	74.0	1.9
Greenling *Hexagrammos lagocephalus* (Yamada Bay)	1	November, 2007	Uncertain	7	420.8 ～ 717.6 (523.0)	32.5 ～ 36.0 (33.8)	75.7	3.7
	2		Uncertain	7	401.5 ～ 476.4 (438.4)	31.0 ～ 32.5 (31.8)	77.4	1.8
	3		Uncertain	8	392.8 ～ 439.3 (411.8)	31.0 ～ 31.2 (31.1)	76.6	2.3
	4		Uncertain	8	329.7 ～ 392.6 (359.1)	30.0 ～ 30.7 (30.2)	77.3	2.3
	5		Uncertain	8	256.6 ～ 374.5 (323.6)	26.7 ～ 30.0 (28.8)	76.1	2.6
Sea bass *Lateolabrax japonicus* (Matsushima Bay)	1	October, 2007	Uncertain	22	96.8 ～ 281 (181)	19.0 ～ 27.5 (23.4)	76.5	1.5
	2		Uncertain	22	98.1 ～ 318 (158)	18.8 ～ 28.2 (22.5)	77.3	1.2
	3		Uncertain	22	93.2 ～ 243 (135)	18.6 ～ 26.9 (21.3)	76.1	1.3
	4		Uncertain	21	88.8 ～ 288 (158)	19.0 ～ 27.8 (22.3)	76.7	1.2
	5		Uncertain	22	88.8 ～ 301 (157)	18.3 ～ 27.3 (22.6)	76.3	1.4
Pacific saury *Cololabis saira* (Offshore of Joban)	1	November, 2007	Mixed	44	75.0 ～ 99.0 (89.9)	24.0 ～ 27.0 (26.1)	70.0	14.2
	2		Mixed	43	102.0 ～ 126.0 (117.0)	27.0 ～ 30.0 (28.3)	67.5	13.0
	3		Mixed	37	127.0 ～ 147.0 (135.3)	28.0 ～ 31.0 (29.5)	63.9	17.0
	4		Mixed	32	150.0 ～ 192.0 (160.7)	29.0 ～ 32.0 (30.7)	61.3	19.6
	5		Mixed	38	85.0 ～ 179.0 (135.1)	26.0 ～ 32.0 (29.6)	65.5	14.6
Sea bass *Lateolabrax japonicus* (Tokyo Bay)	1	August, 2007	Mixed	3	1,842 ～ 2,530 (2,152)	46.2 ～ 53.6 (50.3)	74.5	3.7
	2		Mixed	4	1,392 ～ 1,545 (1,469)	44.8 ～ 46.4 (45.6)	75.3	3.2
	3		Mixed	4	1,250 ～ 1,379 (1,310)	42.0 ～ 49.6 (44.8)	75.6	2.8
	4		Mixed	5	1,004 ～ 1,189 (1,058)	38.2 ～ 41.0 (39.7)	76.3	2.4
	5		Mixed	6	754 ～ 976 (885)	36.2 ～ 38.9 (37.7)	75.9	2.8
Sea bass *Lateolabrax japonicus* (Kawasaki Port)	1	October, 2007	Mixed	5	880 ～ 1,380 (1,024)	39.0 ～ 48.5 (42.2)	71.4	2.0
	2		Mixed	5	910 ～ 1,090 (1,004)	40.5 ～ 44.0 (42.1)	71.9	2.5
	3		Mixed	5	880 ～ 1,200 (1,010)	40.5 ～ 42.5 (41.8)	71.3	1.9
	4		Mixed	5	900 ～ 1,160 (1,006)	39.5 ～ 45.5 (42.8)	74.0	3.0
	5		Mixed	5	900 ～ 1,100 (1,020)	41.5 ～ 43.0 (42.2)	74.2	2.1
Dace *Tribolodon hakonensis* (Lake Biwa, Riv. Azumi)	1	April, 2007	Male	30	162 ～ 262 (198)	24.5 ～ 28.0 (26.0)	74.1	4.0
	2		Female	21	150 ～ 237 (190)	23.2 ～ 26.2 (24.4)	74.1	3.8
	3		Male	30	166 ～ 254 (193)	22.7 ～ 25.4 (24.0)	74.2	3.9
	4		Female	21	159 ～ 259 (188)	23.0 ～ 26.5 (24.0)	74.4	3.9
	5		Male	30	142 ～ 230 (179)	22.2 ～ 25.7 (23.7)	74.4	4.2
Sea bass *Lateolabrax japonicus* (Osaka Bay)	1	August, 2007	Uncertain	7	606 ～ 720 (660)	32.0 ～ 34.0 (33.3)	77.9	2.0
	2		Uncertain	6	540 ～ 815 (718)	33.0 ～ 37.0 (34.7)	76.8	2.9
	3		Uncertain	7	531 ～ 752 (649)	31.0 ～ 35.0 (32.9)	76.2	3.1
	4		Uncertain	8	506 ～ 737 (603)	31.0 ～ 35.0 (32.6)	77.4	2.5
	5		Uncertain	7	622 ～ 770 (692)	30.0 ～ 35.0 (33.6)	77.6	1.9

Fish species (Area)	No.	Sampling month	Sex	Number of animals	Weight (g) (Average)	Length (cm) (Average)	Water content %	Lipid content %
Sea bass *Lateolabrax japonicus* (Offshore of Himeji)	1	November, 2007	Female	2	2,100 ～ 2,300 (2,200)	63 ～ 64 (63.5)	78.4	0.4
	2		Female	2	2,050 ～ 2,500 (2,275)	63 ～ 63 (63.0)	78.0	0.6
	3		Female	2	2,350 ～ 2,500 (2,425)	63 ～ 66 (64.5)	77.5	1.5
	4		Female	1	2,930	67	78.0	0.9
	5		Female	1	2,850	69	76.4	3.0
Sea bass *Lateolabrax japonicus* (Nakaumi)	1	November, 2007	Mixed	8	510 ～ 680 (558)	34.2 ～ 39.0 (36.4)	79.6	1.28
	2		Mixed	10	440 ～ 510 (482)	32.7 ～ 34.6 (33.6)	80.7	1.47
	3		Mixed	11	290 ～ 430 (357)	28.7 ～ 32.7 (30.6)	80.5	1.11
	4		Mixed	14	250 ～ 320 (279)	27.0 ～ 29.4 (28.3)	80.1	1.19
	5		Mixed	18	190 ～ 250 (228)	25.3 ～ 28.8 (26.3)	80.6	1.09
Sea bass *Lateolabrax japonicus* (Hiroshima Bay)	1	October, 2007	Male	5	714 ～ 850 (785)	37.0 ～ 41.0 (39.1)	78.7	0.9
	2		Male	4	745 ～ 894 (815)	38.5 ～ 39.0 (38.7)	78.8	1.4
	3		Male	6	533 ～ 735 (628)	32.5 ～ 38.0 (35.6)	78.8	0.8
	4		Male	6	475 ～ 652 (576)	32.5 ～ 34.5 (33.8)	78.4	0.8
	5		Female	5	665 ～ 784 (727)	36.0 ～ 39.0 (37.1)	78.7	1.4
Sea bass *Lateolabrax japonicus* (Mouth of Riv. Shimanto)	1	November, 2007	Mixed	7	378 ～ 536 (438)	28.4 ～ 31.7 (29.6)	77.8	1.0
	2		Mixed	13	130 ～ 402 (225)	20.1 ～ 29.3 (22.8)	75.6	0.9
	3		Mixed	18	115 ～ 201 (163)	19.0 ～ 22.7 (21.5)	76.5	1.1
	4		Mixed	22	101 ～ 161 (136)	18.4 ～ 21.1 (19.7)	78.4	1.0
	5		Mixed	33	55.2 ～ 125 (92.0)	15.1 ～ 19.5 (17.5)	77.5	1.0
Sea bass *Lateolabrax japonicus* (West Coast of Satsuma Peninsula)	1	December, 2007	Mixed	4	675.8 ～ 818.1 (742.6)	35.0 ～ 35.3 (35.1)	74.4	0.6
	2		Mixed	4	701.7 ～ 795.9 (755.2)	34.0 ～ 34.0 (34.0)	71.4	2.1
	3		Mixed	4	668.5 ～ 772.4 (710.6)	33.0 ～ 33.0 (33.0)	72.7	1.4
	4		Female	4	623.4 ～ 800.3 (693.1)	32.2 ～ 32.6 (32.5)	72.5	1.6
	5		Mixed	5	530.7 ～ 728.7 (617.3)	31.3 ～ 31.5 (31.5)	73.0	1.5
Okinawa seabeam *Acanthopagrus sivicolus* (Nakagusuku Bay)	1	January, 2008	Female	3	1,080 ～ 1,450 (1,220)	31.5 ～ 36.0 (33.2)	77.6	2.3
	2		Female	3	1,160 ～ 1,270 (1,230)	30.0 ～ 32.5 (31.5)	77.6	1.9
	3		Female	3	1,200 ～ 1,250 (1,227)	31.0 ～ 32.0 (31.7)	75.1	1.6
	4		Female	3	1,110 ～ 1,340 (1,213)	31.0 ～ 34.5 (32.7)	76.9	1.6
	5		Male	3	940 ～ 1,120 (1,010)	30.0 ～ 32.0 (31.3)	76.6	1.6

Table 3-2-3 Basic data of specimens (birds as wildlife) in the Environmental Monitoring in FY 2007

Bird species (Area)	No	Sampling month	Sex	Number of animals	Weight (g) (Average)	Length (cm) (Average)	Water content %	Lipid content %
Black-taild gull *Larus crassirostris* (Kabu Is (Hachinohe City))	1	July～ November, 2007	Uncertain	49	274 ～ 546 (416)	30.0 ～ 50.0 (41.0)	73.0	4.2
	2		Uncertain	38	268 ～ 562 (401)	34.0 ～ 49.0 (41.0)	72.1	5.2
	3		Uncertain	43	198 ～ 527 (384)	33.0 ～ 50.0 (41.0)	72.9	4.6
	4		Uncertain	40	312 ～ 521 (410)	33.0 ～ 53.0 (41.0)	73.1	3.9
	5		Uncertain	46	225 ～ 627 (389)	26.0 ～ 52.0 (42.0)	72.0	4.5
Gray starling *Sturnus cineraceus* (Morioka City)	1	October, 2007	Male	49	80.2 ～ 102.2 (91.0)	13.4 ～ 14.4 (13.8)	70.5	4.4
	2		Male	52	70.0 ～ 100.8 (85.1)	12.4 ～ 14.0 (13.1)	70.0	4.7
	3		Female	60	77.2 ～ 99.9 (88.8)	13.0 ～ 13.9 (13.5)	70.1	4.5
	4		Female	78	73.4 ～ 96.9 (84.2)	11.9 ～ 13.2 (12.8)	70.8	4.7
	5		Uncertain	70	71.2 ～ 100.6 (86.2)	12.2 ～ 14.1 (13.2)	70.1	4.7

4. Summary of monitoring results

The detection ranges are shown in Table3-3-1 and Table 3-3-3, and the detection limits are shown in Table 3-3-2 and Table 3-3-4.

The monitoring results in FY 2007 were statistically analyzed together with the previous monitoring results, accumulated over the past 6 years (or 5 years) as a result of successive measurements at the same site or area from FY 2002 (FY 2003 for some substances and media), in order to detect inter-annual trends of increase or decrease over the 6 years (or 5 years). The results of the analyses are shown in Table 3-4.

○Data were carefully handled on the basis of following points.

・For surface water

In Hyogo Pref., 50L and 250L water samples were collected with a high volume sampling system, and only the data of the 250L sample were used.

・For air

At each monitored site, the first sampling was for the monitoring in the warm season (September 4, 2007～October 12, 2007) and the second was for that in the cold season (October 30, 2007～December 21, 2007).

In Kagawa Pref., monitoring was carried out at not only the Takamatsu Joint Prefectural Government Building but also at the location of the Kagawa Prefectural Public Swimming Pool (Takamatsu City) as a reference site.

○Method for regression analysis and testing

The procedures described below were applied in an attempt to analyze and test the monitoring results obtained since FY 2002 (FY 2003 for air) in order to identify statistically significant differences which indicate inter-annual trends.

Using the monitoring results between FY 2002～2007 (FY 2003～2007 for air) successively measured at the same site or area,

① The inter-annual trend analyses and tests were not performed when measured concentrations of more than 50% of samples did not reach the detection limit(nd) in any FY.

② The inter-annual trend analyses and tests were performed when measured concentrations showed a normal distribution for every FY. Normality was assessed by Kolmogorov-Smirnov test on the logarithmically-transformed measured concentrations. The concentrations were deemed to fit with a normal distribution when the significance level (p-value) was more than 5 %.

③ In the inter-annual trend analyses, the trend of increase or decrease was evaluated by examining a slope obtained from simple linear regression analysis (simple log-linear regression model); the slope was deemed to be significant when the significance level (p-value) of T-test on the slope was less than 5 %.

④ In addition, the agreement between the simple log-linear regression model results and measurement results was evaluated based on Akaike's Information Criterion (AIC). AICs were calculated for both "slope model (simple log-linear regression model)" and "non-slope model (residuals from the mean value model)". From these AICs, posteriori probability was calculated. When this probability was more than 95%, the measurement results were deemed to be in agreement with the simple log-linear regression model.

⑤ When significance was found in ③ and agreement was in ④, the concentrations were deemed to have an inter-annual trend of increase or decrease, based on the slope from the simple linear regression analysis.

Table 3-3-1（1/2）List of the detection ranges in the Environmental Monitoring in FY 2007 (Part 1: POPs and HCHs)

No	Target chemicals	Surface water (pg/L)		Sediment (pg/g-dry)	
		Range (Frequency)	Av.	Range (Frequency)	Av.
[1]	Polychlorinated biphenyls (PCBs)	12～2,700 (48/48)	180	19～820,000 (64/64)	6,100
[2]	HCB	tr(4)～190 (48/48)	17	nd～65,000 (64/64)	120
[3]	Aldrin	nd～9.5 (34/48)	tr(0.6)	nd～330 (60/64)	6.6
[4]	Dieldrin	3.1～750 (48/48)	38	tr(1.2)～2,700 (64/64)	42
[5]	Endrin	nd～25 (46/48)	3.5	nd～61,000 (55/64)	9
[6]	DDTs	tr(5.7)～1,400 (48/48)	58	11～280,000 (64/64)	1,500
	[6-1] *p,p'*-DDT	nd～670 (46/48)	7.3	3.0～130,000 (64/64)	170
	[6-2] *p,p'*-DDE	tr(2)～440 (48/48)	22	3.2～61,000 (64/64)	570
	[6-3] *p,p'*-DDD	tr(1.5)～150 (48/48)	15	3.5～80,000 (64/64)	430
	[6-4] *o,p'*-DDT	nd～86 (38/48)	tr(2.1)	nd～27,000 (63/64)	31
	[6-5] *o,p'*-DDE	nd～210 (29/48)	tr(1.5)	nd～25,000 (63/64)	31
	[6-6] *o,p'*-DDD	tr(0.3)～41 (48/48)	4.6	tr(0.5)～21,000 (64/64)	97
[7]	Chlordanes	nd～2,100 (44/48)	62	nd～27,000 (64/64)	270
	[7-1] *cis*-Chlordane	nd～680 (47/48)	23	nd～7,500 (64/64)	73
	[7-2] *trans*-Chlordane	nd～580 (47/48)	16	nd～7,500 (64/64)	72
	[7-3] Oxychlordane	nd～41 (25/48)	tr(2)	nd～76 (46/64)	tr(1.8)
	[7-4] *cis*-Nonachlor	nd～210 (43/48)	5.9	nd～4,200 (64/64)	43
	[7-5] *trans*-Nonachlor	tr(2)～540 (48/48)	17	tr(1.6)～8,400 (64/64)	70
[8]	Heptachlors	nd～130 (41/48)	6.0	nd～300 (36/64)	tr(6.2)
	[8-1] Heptachlor	nd～5.2 (12/48)	nd	nd～110 (57/64)	tr(1.7)
	[8-2] *cis*-Heptachlor epoxide	tr(0.9)～120 (48/48)	6.1	nd～270 (53/64)	3
	[8-3] *trans*-Heptachlor epoxide	nd～tr(0.9) (2/48)	nd	nd～31 (2/64)	nd
[9]	Toxaphenes				
	[9-1] Parlar-26	nd (0/48)	nd	nd (0/64)	nd
	[9-2] Parlar-50	nd (0/48)	nd	nd (0/64)	nd
	[9-3] Parlar-62	nd (0/48)	nd	nd (0/64)	nd
[10]	Mirex	nd～tr(0.5) (2/48)	nd	nd～200 (55/64)	1.3

Table 3-3-1（1/2）List of the detection ranges in the Environmental Monitoring in FY 2007 (Part 1: POPs and HCHs)

No	Target chemicals	Surface water (pg/L)		Sediment (pg/g-dry)	
		Range (Frequency)	Av.	Range (Frequency)	Av.
[11]	HCHs				
	[11-1] α-HCH	13～720 (48/48)	76	tr(1.3)～12,000 (64/64)	120
	[11-2] β-HCH	18～1,300 (48/48)	170	1.6～59,000 (64/64)	170
	[11-3] γ-HCH	5.2～290 (48/48)	34	tr(0.6)～5,200 (64/64)	35
	[11-4] δ-HCH	tr(0.7)～720 (48/48)	11	nd～5,400 (60/64)	22

(Note 1) “Av.” indicates the geometric mean calculated by assuming nd (below the detection limit) to be half the value of the detection limit.
(Note 2) “Range” is based on the concentrations of the samples and “Frequency” is based on the number of sites or areas. Therefore “range” can be shown as “nd～” even if a target chemical is detected in all sites or areas.

Table 3-3-1 (2/2) List of the detection ranges in the Environmental Monitoring in FY 2007 (Part 1: POPs and HCHs)

No	Target chemicals	Wildlife (pg/g-wet)						Air (pg/m^3)			
		Bivalves		Fish		Birds		First (Warm season)		Second (Cold season)	
		Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.
[1]	Polychlorinated biphenyls (PCBs)	980～66,000 (7/7)	6,900	790～530,000 (16/16)	11,000	3,900～15,000 (2/2)	7,500	37～980 (24/24)	250	25～230 (22/22)	72
[2]	HCB	11～400 (7/7)	27	17～1,500 (16/16)	150	420～2,000 (2/2)	940	72～230 (24/24)	110	55～120 (22/22)	77
[3]	Aldrin	nd～26 (2/7)	nd	nd～tr(2) (2/16)	nd	nd (0/2)	nd	nd～19 (35/36)	0.58	nd～2.1 (34/36)	0.14
[4]	Dieldrin	37～77,000 (7/7)	300	23～1,900 (16/16)	240	560～910 (2/2)	710	1.3～310 (36/36)	19	0.96～75 (36/36)	4.5
[5]	Endrin	tr(6)～3,000 (7/7)	26	nd～170 (15/16)	13	nd～55 (2/2)	15	tr(0.06)～6.3 (36/36)	0.69	nd～1.5 (33/36)	0.16
[6]	DDTs	510～8,200 (7/7)	1,900	240～32,000 (16/16)	3,200	7,000～320,000 (2/2)	38,000	1.7～170 (36/36)	16	1.5～56 (36/36)	4.6
	[6-1] *p,p'*-DDT	49～1,200 (7/7)	200	9～1,800 (16/16)	250	160～1,900 (2/2)	450	0.6～30 (36/36)	4.9	0.23～8.8 (36/36)	1.2
	[6-2] *p,p'*-DDE	180～5,600 (7/7)	980	160～22,000 (16/16)	2,100	6,700～320,000 (2/2)	38,000	0.54～120 (36/36)	6.4	0.73～39 (36/36)	2.1
	[6-3] *p,p'*-DDD	7～1,500 (7/7)	250	36～4,100 (16/16)	440	70～2,300 (2/2)	430	0.046～1.4 (36/36)	0.26	0.026～0.50 (36/36)	0.093
	[6-4] *o,p'*-DDT	20～350 (7/7)	64	3～430 (16/16)	66	tr(2)～26 (2/2)	8	0.24～19 (36/36)	2.9	0.31～3.4 (36/36)	0.77
	[6-5] *o,p'*-DDE	8.9～410 (7/7)	51	nd～4,400 (16/16)	43	nd～2.8 (2/2)	tr(1.1)	0.096～7.0 (36/36)	0.66	0.12～3.7 (36/36)	0.30
	[6-6] *o,p'*-DDD	6～1,200 (7/7)	130	nd～1,300 (16/16)	63	5～10 (2/2)	7	0.05～1.9 (36/36)	0.28	tr(0.03)～0.33 (36/36)	0.095
[7]	Chlordanes	200～23,000 (7/7)	2,200	150～19,000 (16/16)	1,800	620～2,400 (2/2)	1,400	11～3,500 (36/36)	280	4.4～740 (36/36)	53
	[7-1] *cis*-Chlordane	59～19,000 (7/7)	760	30～5,200 (16/16)	410	tr(4)～230 (2/2)	30	3.3～1,100 (36/36)	90	1.4～230 (36/36)	17
	[7-2] *trans*-Chlordane	34～1,500 (7/7)	360	8～2,100 (16/16)	120	tr(3)～19 (2/2)	7	3.8～1,300 (36/36)	100	1.5～300 (36/36)	20
	[7-3] Oxychlordane	8～2,200 (7/7)	62	17～1,900 (16/16)	120	290～740 (2/2)	440	0.56～8.6 (36/36)	1.9	0.26～2.4 (36/36)	0.61
	[7-4] *cis*-Nonachlor	26～1,000 (7/7)	210	16～3,700 (16/16)	310	42～300 (2/2)	120	0.31～150 (36/36)	10	0.09～22 (36/36)	1.6
	[7-5] *trans*-Nonachlor	71～2,400 (7/7)	540	71～7,900 (16/16)	780	200～1,400 (2/2)	590	2.5～940 (36/36)	72	1.1～190 (36/36)	13
[8]	Heptachlors	tr(8)～1,200 (7/7)	35	nd～400 (16/16)	40	250～350 (2/2)	280	1.6～330 (36/36)	26	1.1～77 (36/36)	7.6
	[8-1] Heptachlor	nd～12 (6/7)	tr(3)	nd～7 (6/16)	nd	nd (0/2)	nd	1.1～320 (36/36)	22	0.42～74 (36/36)	6.3
	[8-2] *cis*-Heptachlor epoxide	8～1,100 (7/7)	30	4～390 (16/16)	41	250～350 (2/2)	280	0.54～13 (36/36)	2.9	0.41～3.0 (36/36)	0.93
	[8-3] *trans*-Heptachlor epoxide	nd～61 (1/7)	nd	nd (0/16)	nd	nd (0/2)	nd	nd～0.16 (8/36)	nd	nd～tr(0.06) (1/36)	nd
[9]	Toxaphenes										
	[9-1] Parlar-26	nd～20 (6/7)	tr(8)	nd～690 (14/16)	24	nd～650 (1/2)	34	nd～tr(0.3) (18/36)	nd	nd (0/36)	nd
	[9-2] Parlar-50	nd～37 (7/7)	10	nd～1,100 (16/16)	32	nd～930 (1/2)	34	nd～tr(0.2) (29/36)	nd	nd (0/36)	nd
	[9-3] Parlar-62	nd (0/7)	nd	nd～530 (7/16)	nd	nd～300 (1/2)	tr(60)	nd (0/36)	nd	nd (0/36)	nd
[10]	Mirex	tr(2)～18	5	tr(1)～36	9	32～100	56	0.04～0.28	0.11	tr(0.02)～0.09	0.04

Table 3-3-1（2/2）List of the detection ranges in the Environmental Monitoring in FY 2007 (Part 1: POPs and HCHs)

No	Target chemicals	Wildlife (pg/g-wet)						Air (pg/m^3)			
		Bivalves		Fish		Birds		First (Warm season)		Second (Cold season)	
		Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.
[11]	HCHs										
	[11-1] α-HCH	8～1,400 (7/7)	19	tr(2)～730 (16/16)	37	43～210 (2/2)	68	28～2,200 (36/36)	190	9.7～730 (36/36)	46
	[11-2] β-HCH	21～1,800 (7/7)	53	7～810 (16/16)	100	1,400～3,200 (2/2)	2,000	1.1～67 (36/36)	9.1	0.52～17 (36/36)	1.9
	[11-3] γ-HCH	tr(4)～450 (7/7)	11	nd～190 (15/16)	15	tr(8)～140 (2/2)	18	7.7～750 (36/36)	58	2.3～160 (36/36)	13
	[11-4] δ-HCH	nd～750 (4/7)	nd	nd～31 (10/16)	tr(3)	4～22 (2/2)	10	0.27～37 (36/36)	2.8	0.12～24 (36/36)	0.63

(Note 1) “Av.” indicates the geometric mean calculated by assuming nd (below the detection limit) to be half the value of the detection limit.

(Note 2) “Range” is based on the concentrations of the samples and “Frequency” is based on the number of sites or areas. Therefore “range” can be shown as “nd～” even if a target chemical is detected in all sites or areas.

Table3-3-2 List of the quantification [detection] limits in the Environmental Monitoring in FY 2007 (Part 1: POPs and HCHs)

No	Target chemicals	Surface water (pg/L)	Sediment (pg/g-dry)	Wildlife (pg/g-wet)	Air (pg/m^3)
[1]	Polychlorinated biphenyls (PCBs)	※7.6 ※[2.9]	※4.7 ※[1.5]	※46 ※[18]	※0.37 ※[0.13]
[2]	HCB	8 [3]	5 [2]	7 [3]	0.09 [0.03]
[3]	Aldrin	1.0 [0.3]	1.8 [0.6]	5 [2]	0.05 [0.02]
[4]	Dieldrin	2.1 [0.7]	2.7 [0.9]	9 [3]	0.18 [0.07]
[5]	Endrin	1.9 [0.6]	5 [2]	9 [3]	0.09 [0.04]
[6]	DDTs	※13 ※[5.1]	※7.4 ※[2.7]	※19 ※[6.9]	※0.22 ※[0.091]
	[6-1] p,p'-DDT	1.7 [0.6]	1.3 [0.5]	5 [2]	0.07 [0.03]
	[6-2] p,p'-DDE	4 [2]	1.1 [0.4]	3 [1]	0.04 [0.02]
	[6-3] p,p'-DDD	1.7 [0.6]	1.0 [0.4]	3 [1]	0.011 [0.004]
	[6-4] o,p'-DDT	2.5 [0.8]	1.8 [0.6]	3 [1]	0.03 [0.01]
	[6-5] o,p'-DDE	2.3 [0.8]	1.2 [0.4]	2.3 [0.9]	0.017 [0.007]
	[6-6] o,p'-DDD	0.8 [0.3]	1.0 [0.4]	3 [1]	0.05 [0.02]
[7]	Chlordanes	※20 ※[7.6]	※13 ※[4.9]	※27 ※[10]	※0.39 ※[0.15]
	[7-1] cis-Chlordane	4 [2]	5 [2]	5 [2]	0.1 [0.04]
	[7-2] trans-Chlordane	2.4 [0.8]	2.2 [0.8]	6 [2]	0.12 [0.05]
	[7-3] Oxychlordane	6 [2]	2.5 [0.9]	6 [2]	0.05 [0.02]
	[7-4] cis-Nonachlor	2.4 [0.8]	1.6 [0.6]	3 [1]	0.03 [0.01]
	[7-5] trans-Nonachlor	5 [2]	1.7 [0.6]	7 [3]	0.09 [0.03]
[8]	Heptachlors	※5.7 ※[1.9]	※16 ※[5.7]	※23 ※[8]	※0.24 ※[0.10]
	[8-1] Heptachlor	2.4 [0.8]	3.0 [0.7]	6 [2]	0.07 [0.03]
	[8-2] cis-Heptachlor epoxide	1.3 [0.4]	3 [1]	4 [1]	0.03 [0.01]
	[8-3] trans-Heptachlor epoxide	2.0 [0.7]	10 [4]	13 [5]	0.14 [0.06]
[9]	Toxaphenes				
	[9-1] Parlar-26	20 [5]	7 [3]	10 [4]	0.6 [0.2]
	[9-2] Parlar-50	9 [3]	30 [10]	9 [3]	0.3 [0.1]
	[9-3] Parlar-62	70 [30]	300 [70]	70 [30]	1.5 [0.6]
[10]	Mirex	1.1 [0.4]	0.9 [0.3]	3 [1]	0.03 [0.01]
[11]	HCHs				
	[11-1] α-HCH	1.9 [0.6]	1.8 [0.6]	7 [2]	0.09 [0.04]
	[11-2] β-HCH	2.7 [0.9]	0.9 [0.3]	7 [3]	0.06 [0.02]
	[11-3] γ-HCH	2.1 [0.7]	1.2 [0.4]	9 [3]	0.11 [0.04]
	[11-4] δ-HCH	1.2 [0.4]	5 [2]	4 [2]	0.05 [0.02]

(Note 1) Each quantification limit is shown above the corresponding [detection limit].
(Note 2) The quantification [detection] limit of polychlorinated biphenyls (PCBs) is the sum value of congeners (Cl1～Cl10).
(Note 3) The same quantification [detection] limit was employed for bivalves, fish and birds as wildlife for each target chemical.
(Note 4) The quantification [detection] limit for surface water offshore of Himeji was different from the value shown in the table.

Table 3-3-3（1/2）List of the detection ranges in the Environmental Monitoring in FY 2007 (Part 2: Target chemicals except POPs and HCHs)

No	Target chemicals	Surface water (ng/L)		Sediment (ng/g-dry)	
		Range (Frequency)	Av.	Range (Frequency)	Av.
[12]	Acrylamide	nd～49 (13/48)	tr(2.3)	nd～1.9 (40/64)	tr(0.11)
[13]	Trichlorobenzenes				
	[13-1] 1,2,3- Trichlorobenzene				
	[13-2] 1,2,4- Trichlorobenzene				
	[13-3] 1,3,5- Trichlorobenzene				
[14]	Tetrachlorobenzenes				
	[14-1] 1,2,3,4- Tetrachlorobenzene				
	[14-2] 1,2,3,5- Tetrachlorobenzene				
	[14-3] 1,2,4,5- Tetrachlorobenzene				
[15]	Pentachlorobenzene	nd (0/48)	nd	nd～24 (35/64)	tr(0.043)
[16]	Tetrabromobisphenol A	nd～tr(5.1) (1/48)	nd	nd～6.2 (13/64)	nd
[17]	Hexachlorobuta-1,3-diene	nd (0/48)	nd	nd～1.3 (10/64)	nd
[18]	Hexabromobenzene	nd (0/48)	nd	nd～15 (21/64)	nd

(Note 1) “Av.” indicates the geometric mean calculated by assuming nd (below the detection limit) to be half the value of the detection limit.
(Note 2) “Range” is based on the concentrations of the samples and “Frequency” is based on the number of sites or areas. Therefore “range” can be shown as “nd～” even if a target chemical is detected in all sites (or areas).
(Note 3) ▭ means the medium was not monitored.

Table 3-3-3（2/2）List of the detection ranges in the Environmental Monitoring in FY 2007 (Part 2: Target chemicals except POPs and HCHs)

No	Target chemicals	Wildlife (ng/g-wet)						Air (ng/m^3)			
		Bivalves		Fish		Birds		First (Warm season)		Second (Cold season)	
		Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.
[12]	Acrylamide	tr(0.05)～1.4 (7/7)	0.34	nd～1.9 (16/16)	0.17	0.24～0.68 (2/2)	0.39				
[13]	Trichlorobenzenes							0.23～17 (26/26)	1.4	0.22～15 (25/25)	1.1
	[13-1] 1,2,3-Trichlorobenzene							tr(0.019)～1.7 (26/26)	0.22	tr(0.026)～1.7 (25/25)	0.18
	[13-2] 1,2,4-Trichlorobenzene							0.20～15 (26/26)	1.1	0.18～14 (25/25)	0.85
	[13-3] 1,3,5-Trichlorobenzene							tr(0.011)～1.3 (26/26)	0.060	tr(0.010)～0.23 (25/25)	0.053
[14]	Tetrachlorobenzenes							0.058～1.6 (26/26)	0.18	0.071～0.65 (25/25)	0.16
	[14-1] 1,2,3,4-Tetrachlorobenzene							0.031～0.95 (26/26)	0.085	0.033～0.40 (25/25)	0.076
	[14-2] 1,2,3,5-Tetrachlorobenzene							tr(0.007)～0.29 (26/26)	0.040	tr(0.013)～0.15 (25/25)	0.037
	[14-3] 1,2,4,5-Tetrachlorobenzene							0.020～0.39 (26/26)	0.052	0.017～0.15 (25/25)	0.042
[15]	Pentachlorobenzene	nd～tr(0.15) (1/7)	nd	nd～0.48 (10/16)	nd	tr(0.089)～0.21 (2/2)	tr(0.14)	0.018～0.31 (26/26)	0.085	0.027～0.22 (25/25)	0.060
[16]	Tetrabromobisphenol A	nd～tr(0.09) (1/7)	nd	nd～tr(0.09) (4/16)	nd	nd (0/2)	nd				
[17]	Hexachlorobuta-1,3-diene	nd (0/7)	nd	nd (0/16)	nd	nd (0/2)	nd				
[18]	Hexabromobenzene	nd (0/7)	nd	nd～tr(0.2) (6/16)	nd	nd～tr(0.2) (1/2)	nd				

(Note 1) “Av.” indicates the geometric mean calculated by assuming nd (below the detection limit) to be half the value of the detection limit.
(Note 2) “Range” is based on the concentrations of the samples and “Frequency” is based on the number of sites or areas. Therefore “range” can be shown as “nd～” even if a target chemical is detected in all sites (or areas).
(Note 3) ▭ means the medium was not monitored.

Table 3-3-4 List of the quantification [detection] limits in the Environmental Monitoring in FY 2007 (Part 2: Target chemicals except POPs and HCHs)

No	Target chemicals	Surface water (ng/L)	Sediment (ng/g-dry)	Wildlife (ng/g-wet)	Air (ng/m^3)
[12]	Acrylamide	5.9 [2.3]	0.20 [0.079]	0.067 [0.022]	
[13]	Trichlorobenzenes				※0.072 ※[0.027]
	[13-1] 1,2,3-Trichlorobenzene				0.029 [0.011]
	[13-2] 1,2,4-Trichlorobenzene				0.027 [0.010]
	[13-3] 1,3,5-Trichlorobenzene				0.016 [0.0063]
[14]	Tetrachlorobenzenes				※0.040 ※[0.016]
	[14-1] 1,2,3,4-Tetrachlorobenzene				0.011 [0.0041]
	[14-2] 1,2,3,5-Tetrachlorobenzene				0.015 [0.0058]
	[14-3] 1,2,4,5-Tetrachlorobenzene				0.014 [0.0056]
[15]	Pentachlorobenzene	3.3 [1.3]	0.086 [0.033]	0.18 [0.061]	0.012 [0.0048]
[16]	Tetrabromobisphenol A	5.5 [2.1]	1.5 [0.57]	0.18 [0.06]	
[17]	Hexachlorobuta-1,3-diene	0.87 [0.34]	0.022 [0.0085]	0.036 [0.012]	
[18]	Hexabromobenzene	5.4 [2.1]	2.8 [1.1]	0.3 [0.1]	

(Note 1) Each quantification limit is shown above the corresponding [detection limit].
(Note 2) The quantification [detection] limit of polychlorinated naphthalenes is the sum value of congeners (Cl1～Cl8).
(Note 3) The same quantification [detection] limit was employed for bivalves, fish and birds as wildlife for each target chemical.
(Note 4) ▭ means the medium was not monitored.

Table 3-4 Results of inter-annual trend analysis between FY2002 (FY2003 for some substances and media) and FY2007

Target chemicals		Surface water	Sediment	Wildlife			Air	
No	Name			Bivalves	Fish	Birds	Warm season	Cold season
[1]	Polychlorinated biphenyls (PCBs)	no normality	—	—	—	—	—	—
[2]	HCB	no normality	—	no normality	—	—	no normality	↘
[3]	Aldrin	more than half are nd	no normality	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
[4]	Dieldrin	—	—	no normality	—	↘	—	—
[5]	Endrin	—	no normality	no normality	no normality	—	—	more than half are nd
[6]	DDTs							
	[6-1] *p,p'*-DDT	—	no normality	—	no normality	—	—	—
	[6-2] *p,p'*-DDE	—	no normality	no normality	—	—	—	—
	[6-3] *p,p'*-DDD	no normality	—	—	—	—	—	—
	[6-4] *o,p'*-DDT	↘	—	↘	no normality	—	↘	↘
	[6-5] *o,p'*-DDE	no normality	—	—	—	↘	↘	—
	[6-6] *o,p'*-DDD	no normality	—	—	—	↘	—	—
[7]	Chlordanes							
	[7-1] *cis*- Chlordane	—	no normality	—	—	—	—	—
	[7-2] *trans*- Chlordane	↘	↘	—	—	—	—	—
	[7-3] Oxychlordane	no normality	no normality	—	—	↘	—	↘
	[7-4] *cis*- Nonachlor	—	—	—	—	—	—	—
	[7-5] *trans*- Nonachlor	↘	no normality	no normality	—	—	—	—
[8]	Heptachlors							
	[8-1] Heptachlor	more than half are nd	no normality	no normality	more than half are nd	more than half are nd	—	—
	[8-2] *cis*- Heptachlor epoxide	—	no normality	no normality	—	↘	—	↘
	[8-3] *trans*- Heptachlor epoxide	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
[9]	Toxaphenes							
	[9-1] Parlar-26	more than half are nd	more than half are nd	more than half are nd	no normality	—	more than half are nd	more than half are nd
	[9-2] Parlar-50	more than half are nd	more than half are nd	more than half- are nd	no normality	—	more than half are nd	more than half are nd
	[9-3] Parlar-62	more than half are nd	more than half are nd	more than half are nd	more than half are nd	—	more than half are nd	more than half are nd
[10]	Mirex	more than half are nd	no normality	—	no normality	—	no normality	no normality
[11]	HCHs							
	[11-1] *α*-HCH	—	no normality	no normality	—	—	—	—
	[11-2] *β*-HCH	—	—	no normality	—	—	—	—
	[11-3] *γ*-HCH	↘	—	no normality	—	—	—	—
	[11-4] *δ*-HCH	no normality	↘	more than half are nd	no normality	—	—	—

"↘": An inter-annual trend of decrease was found
"—": An inter-annual trend was not found.
"more than half are nd ": The inter-annual trend analysis was not performed because measured concentrations of more than 50% of samples did not reach the detection limit(nd) in a FY or more.
"no normality": The inter-annual trend analysis was not performed because measured concentrations did not show a normal distribution in a FY or more.

(1) The Environmental Monitoring (POPs and HCHs)

The high-sensitivity analysis of POPs and HCHs was conducted in FY 2007, following the monitoring in FY 2002, 2003, 2004, 2005 and 2006. Except for cases of undetected toxaphenes (Parlar-26, Parlar-50, Parlar-62) in surface water and sediment, toxaphenes (Parlar-62) in wildlife (bivalves), heptachlors (*trans*-heptachlor epoxide) in wildlife (fish), aldrin and heptachlors (heptachlor and *trans*-heptachlor epoxide) in wildlife (birds), and toxaphenes (Parlar-26, Parlar-50, Parlar-62) in air, all chemicals were detected.

The monitoring results for each chemical (group) are described below.

[1] PCBs

- History and state of monitoring

Polychlorinated biphenyls (PCBs) were designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in June 1974, since the substance is persistent, highly accumulative in living organisms, and chronically toxic.

In previous monitoring series, the substances were monitored in wildlife (bivalves, fish and birds) during the period of FY 1978～2001 under the framework of "the Wildlife Monitoring." Under the framework of "The Follow-up Survey of the Status of Pollution by Unintentionally Formed Chemicals,"sediment and wildlife (fish) were the monitored media in FY 1996 and FY 1997, and surface water, sediment, wildlife (fish) and air were the monitored media in FY 2000 and FY 2001.

- Monitoring results

The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of ※2.9 pg/L, and the detection range was 12～2,700 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of ※1.5 pg/g-dry, and the detection range was 19～820,000 pg/g-dry.

Stocktaking of the detection of PCBs (total amount) in surface water and sediment during FY 2002～2007

PCBs (total amount)	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	460	330	11,000	60	※7.4 [2.5]	114/114	38/38
	2003	530	450	3,100	230	※9.4 [2.5]	36/36	36/36
	2004	630	540	4,400	140	※14 [5.0]	38/38	38/38
	2005	520	370	7,800	140	※10 [3.2]	47/47	47/47
	2006	240	200	4,300	15	※9 [3]	48/48	48/48
	2007	180	140	2,700	12	※7.6[2.9]	48/48	48/48
Sediment (pg/g-dry)	2002	9,200	11,000	630,000	39	※10 [3.5]	189/189	63/63
	2003	8,200	9,500	5,600,000	39	※10 [3.2]	186/186	62/62
	2004	7,300	7,600	1,300,000	38	※7.9 [2.6]	189/189	63/63
	2005	7,500	7,100	690,000	42	※6.3 [2.1]	189/189	63/63
	2006	7,600	6,600	690,000	36	※4 [1]	192/192	64/64
	2007	6,100	6,800	820,000	19	※4.7[1.5]	192/192	64/64

(Note) ※ indicates the sum value of the Quantification [Detection] limits of each congener.

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of ※18 pg/g-wet, and the detection range was 980～66,000 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of ※18 pg/g-wet, and the detection range was 790～530,000 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of ※18 pg/g-wet, and the detection range was 3,900～15,000 pg/g-wet.

Stocktaking of the detection of PCBs (total amount) in wildlife (bivalves, fish and birds) during FY 2002～2007

PCBs (total amount)	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	10,000	28,000	160,000	200	※25 [8.4]	38/38	8/8
	2003	11,000	9,600	130,000	1,000	※50 [17]	30/30	6/6
	2004	7,700	11,000	150,000	1,500	※85 [29]	31/31	7/7
	2005	8,200	13,000	85,000	920	※69 [23]	31/31	7/7
	2006	6,400	8,600	77,000	690	※42 [14]	31/31	7/7
	2007	6,900	11,000	66,000	980	※46 [18]	31/31	7/7
Fish (pg/g-wet)	2002	14,000	8,100	550,000	1,500	※25 [8.4]	70/70	14/14
	2003	11,000	9,600	150,000	870	※50 [17]	70/70	14/14
	2004	15,000	10,000	540,000	990	※85 [29]	70/70	14/14
	2005	13,000	8,600	540,000	800	※69 [23]	80/80	16/16
	2006	12,000	9,000	310,000	990	※42 [14]	80/80	16/16
	2007	11,000	6,200	530,000	790	※46 [18]	80/80	16/16
Birds (pg/g-wet)	2002	11,000	14,000	22,000	4,800	※25 [8.4]	10/10	2/2
	2003	18,000	22,000	42,000	6,800	※50 [17]	10/10	2/2
	2004	8,900	9,400	13,000	5,900	※85 [29]	10/10	2/2
	2005	10,000	9,700	19,000	5,600	※69 [23]	10/10	2/2
	2006	11,000	9,800	48,000	5,600	※42 [14]	10/10	2/2
	2007	7,500	7,800	15,000	3,900	※46 [18]	10/10	2/2

(Note) ※ indicates the sum value of the Quantification [Detection] limits of each congener.

The presence of the substance in air in the warm season was monitored at 36 sites and, excluding 12 sites whose concentration were treated as invalid, it was detected at all 24 valid sites adopting the detection limit of ※0.13 pg/m^3, and the detection range was 37～980 pg/m^3.

For air in the cold season, the substance was monitored at 36 sites and, excluding 14 sites whose concentration were treated as invalid, it was detected at all 22 valid sites adopting the detection limit of ※0.13 pg/m^3, and the detection range was 25～230 pg/m^3.

The cause of the above-mentioned invalidity at 12 sites in the warm season and at 14 sites in the cold season was the malfunction of measuring instruments.

Stocktaking of the detection of PCBs (total amount) in air during FY 2002～2007

PCBs (total amount)	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	※※2002	100	100	880	16	※99 [33]	102/102	34/34
	2003Warm season	260	340	2,600	36	※6.6 [2.2]	35/35	35/35
	2003Cold season	110	120	630	17		34/34	34/34
	2004Warm season	240	250	3,300	25	※2.9 [0.98]	37/37	37/37
	2004Cold season	130	130	1,500	20		37/37	37/37
	2005Warm season	190	210	1,500	23	※0.38 [0.14]	37/37	37/37
	2005Cold season	66	64	380	20		37/37	37/37
	2006Warm season	170	180	1,500	21	※0.8 [0.3]	37/37	37/37
	2006Cold season	82	90	450	19		37/37	37/37
	2007Warm season	250	290	980	37	※0.37 [0.13]	24/24	24/24
	2007Cold season	72	76	230	25		22/22	22/22

(Note 1) ※ indicates the sum value of the Quantification [Detection] limits of each congener.
(Note 2) In 2002, there was a technical problem in the measuring method for lowly chlorinated congeners, and therefore the values are shown just as reference.

[2] Hexachlorobenzene

- History and state of monitoring

Hexachlorobenzene was designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in August 1979, since the substance is persistent, highly accumulative in living organisms, and chronically toxic.

In previous monitoring series, the substance was monitored in wildlife (bivalves, fish and birds) during the period of FY 1978～1996 and in FY 1998, FY 2000 and FY 2001 under the framework of "the Wildlife Monitoring." Under the framework of "the Surface Water/Sediment Monitoring," the substance in surface water and sediment was monitored during the period of FY 1986～1998 and FY 1986～2001, respectively. Under the framework of the Environmental Monitoring, the substance In surface water, sediment, wildlife (bivalves, fish, and birds) and air has been monitored since FY 2002.

- Monitoring results

The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 3 pg/L, and the detection range was tr(4)～190 pg/L.

The presence of the substance in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of 2 pg/g-dry, and none of the detected concentrations exceeded 65,000 pg/g-dry.

Stocktaking of the detection of hexachlorobenzene in surface water and sediment during FY 2002～2007

Hexachlorobenzene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	36	28	1,400	9.8	0.6 [0.2]	114/114	38/38
	2003	29	24	340	11	5 [2]	36/36	36/36
	2004	30	tr(29)	180	tr(11)	30 [8]	38/38	38/38
	2005	21	17	210	tr(6)	15 [5]	47/47	47/47
	2006	16	tr(12)	190	nd	16 [5]	46/48	46/48
	2007	17	14	190	tr(4)	8 [3]	48/48	48/48
Sediment (pg/g-dry)	2002	210	200	19,000	7.6	0.9 [0.3]	189/189	63/63
	2003	140	120	42,000	5	4 [2]	186/186	62/62
	2004	130	100	25,000	tr(6)	7 [3]	189/189	63/63
	2005	160	130	22,000	13	3 [1]	189/189	63/63
	2006	170	120	19,000	10	2.9 [1.0]	192/192	64/64
	2007	120	110	65,000	nd	5 [2]	191/192	64/64

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 11～400 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 17～1,500 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 420～2,000 pg/g-wet.

Stocktaking of the detection of hexachlorobenzene in wildlife (bivalves, fish and birds) during FY 2002～2007

Hexachlorobenzene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	23	22	330	2.4	0.18 [0.06]	38/38	8/8
	2003	44	27	660	tr(21)	23 [7.5]	30/30	6/6
	2004	30	31	80	14	14 [4.6]	31/31	7/7
	2005	38	28	450	19	11 [3.8]	31/31	7/7
	2006	35	28	340	11	3 [1]	31/31	7/7
	2007	27	22	400	11	7 [3]	31/31	7/7
Fish (pg/g-wet)	2002	140	180	910	19	0.18 [0.06]	70/70	14/14
	2003	170	170	1,500	28	23 [7.5]	70/70	14/14
	2004	220	210	1,800	26	14 [4.6]	70/70	14/14
	2005	170	160	1,700	29	11 [3.8]	80/80	16/16
	2006	170	220	1,400	25	3 [1]	80/80	16/16
	2007	150	140	1,500	17	7 [3]	80/80	16/16
Birds (pg/g-wet)	2002	1,000	1,200	1,600	560	0.18 [0.06]	10/10	2/2
	2003	1,700	2,000	4,700	790	23 [7.5]	10/10	2/2
	2004	970	1,300	2,200	410	14 [4.6]	10/10	2/2
	2005	980	1,100	2,500	400	11 [3.8]	10/10	2/2
	2006	960	1,100	2,100	490	3 [1]	10/10	2/2
	2007	940	1,100	2,000	420	7 [3]	10/10	2/2

The presence of the substance in air in the warm season was monitored at 36 sites and, excluding 12 sites whose concentration were treated as invalid, it was detected at all 24 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 72～230 pg/m^3. For air in the cold season, the substance was monitored at 36 sites and, excluding 14 sites whose concentration were treated as invalid, it was detected at all 22 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 55～120 pg/m^3, and it was concluded that the concentration trend of decrease from 2003 to 2007 was statistically significant.

Stocktaking of the detection of hexachlorobenzene in air during FY 2002～2007

Hexachlorobenzene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	99	93	3,000	57	0.9 [0.3]	102/102	34/34
	2003Warm season	150	130	430	81	2.3 [0.78]	35/35	35/35
	2003Cold season	94	90	320	64		34/34	34/34
	2004Warm season	130	130	430	47	1.1 [0.37]	37/37	37/37
	2004Cold season	98	89	390	51		37/37	37/37
	2005Warm season	88	90	250	27	0.14 [0.034]	37/37	37/37
	2005Cold season	77	68	180	44		37/37	37/37
	2006Warm season	83	89	210	23	0.21 [0.07]	37/37	37/37
	2006Cold season	65	74	170	8.2		37/37	37/37
	2007Warm season	110	100	230	72	0.09 [0.03]	24/24	24/24
	2007Cold season	77	72	120	55		22/22	22/22

[3] Aldrin

- History and state of monitoring

Aldrin had been used as a soil insecticide until FY 1971 when the application of the substance was substantially stopped. Its registration under the Agricultural Chemicals Regulation Law was expired in FY 1975. It was designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in October 1981.

- Monitoring results

The presence of the substance in surface water was monitored at 48 sites, and it was detected at 34 of the 48 valid sites adopting the detection limit of 0.3 pg/L, and none of the detected concentrations exceeded 9.5 pg/L.

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 60 of the 64 valid sites adopting the detection limit of 0.6 pg/g-dry, and none of the detected concentrations exceeded 330 pg/g-dry.

Stocktaking of the detection of aldrin in surface water and sediment during FY 2002～2007

Aldrin	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	0.69	0.90	18	nd	0.6 [0.2]	93/114	37/38
	2003	0.9	0.9	3.8	nd	0.6 [0.2]	34/36	34/36
	2004	tr(1.5)	tr(1.8)	13	nd	2 [0.4]	33/38	33/38
	2005	tr(0.6)	tr(0.7)	5.7	nd	0.9 [0.3]	32/47	32/47
	2006	nd	nd	4.4	nd	1.7 [0.6]	18/48	18/48
	2007	tr(0.6)	tr(0.6)	9.5	nd	1.0[0.3]	34/48	34/48
Sediment (pg/g-dry)	2002	12	12	570	nd	6 [2]	149/189	56/63
	2003	17	18	1,000	nd	2 [0.6]	178/186	60/62
	2004	9	10	390	nd	2 [0.6]	170/189	62/63
	2005	7.5	7.1	500	nd	1.4 [0.5]	173/189	62/63
	2006	9.1	9.3	330	nd	1.9 [0.6]	184/192	64/64
	2007	6.6	6.7	330	nd	1.8[0.6]	172/192	60/64

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 2 of the 7 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded 26 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in 2 of the 16 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded tr(2) pg/g-wet. For birds, the substance was monitored in 2 areas and detected in none of 2 valid areas adopting the detection limit of 2 pg/g-wet.

Stocktaking of the detection of aldrin in wildlife (bivalves, fish and birds) during FY 2002～2007

Aldrin	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	tr(1.7)	nd	34	nd	4.2 [1.4]	12/38	4/8
	2003	tr(1.6)	tr(0.85)	51	nd	2.5 [0.84]	15/30	3/6
	2004	tr(1.7)	tr(1.6)	46	nd	4 [1.3]	16/31	4/7
	2005	nd	nd	84	nd	3.5 [1.2]	11/31	3/7
	2006	nd	nd	19	nd	4 [2]	11/31	3/7
	2007	nd	nd	26	nd	5 [2]	5/31	2/7
Fish (pg/g-wet)	2002	nd	nd	tr(2.0)	nd	4.2 [1.4]	1/70	1/14
	2003	nd	nd	tr(1.9)	nd	2.5 [0.84]	16/70	7/14
	2004	nd	nd	tr(2.4)	nd	4 [1.3]	5/70	2/14
	2005	nd	nd	6.4	nd	3.5 [1.2]	11/80	5/16
	2006	nd	nd	tr(2)	nd	4 [2]	2/80	2/16
	2007	nd	nd	tr(2)	nd	5 [2]	2/80	2/16
Birds (pg/g-wet)	2002	nd	nd	nd	nd	4.2 [1.4]	0/10	0/2
	2003	nd	nd	nd	nd	2.5 [0.84]	0/10	0/2
	2004	nd	nd	nd	nd	4 [1.3]	0/10	0/2
	2005	nd	nd	nd	nd	3.5 [1.2]	0/10	0/2
	2006	nd	nd	nd	nd	4 [2]	0/10	0/2
	2007	nd	nd	nd	nd	5 [2]	0/10	0/2

The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at 35 of the 36 valid sites adopting the detection limit of 0.02 pg/m^3, and none of the detected concentrations exceeded 19 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at 34 of the 36 valid areas adopting the detection limit of 0.02 pg/m^3, and none of the detected concentrations exceeded 2.1 pg/m^3.

Stocktaking of the detection of aldrin in air during FY 2002～2007

Aldrin	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	tr(0.030)	nd	3.2	nd	0.060 [0.020]	41/102	19/34
	2003Warm season	1.5	1.9	28	nd	0.023 [0.0077]	34/35	34/35
	2003Cold season	0.55	0.44	6.9	0.030		34/34	34/34
	2004Warm season	tr(0.12)	nd	14	nd	0.15 [0.05]	15/37	15/37
	2004Cold season	tr(0.08)	nd	13	nd		14/37	14/37
	2005Warm season	0.33	0.56	10	nd	0.08 [0.03]	29/37	29/37
	2005Cold season	tr(0.04)	nd	1.8	nd		9/37	9/37
	2006Warm season	0.30	0.35	8.5	nd	0.14 [0.05]	31/37	31/37
	2006Cold season	tr(0.05)	nd	1.1	nd		16/37	16/37
	2007Warm season	0.58	0.48	19	nd	0.05 [0.02]	35/36	35/36
	2007Cold season	0.14	0.15	2.1	nd		34/36	34/36

[4] Dieldrin

- History and state of monitoring

Dieldrin was used as a pesticide and its application culminated during the period of 1955～1964. The substance had been used as termitecides as a Soil-Residue-Prone Pesticide under the Agricultural Chemicals Regulation Law in 1971, but its registration under the Agricultural Chemicals Regulation Law was expired in FY 1975. It was designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in October 1981.

- Monitoring results

The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.7 pg/L, and the detection range was 3.1～750 pg/L.

The presence of the substance in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of 0.9 pg/g-dry, and the detection range was tr(1.2)～2,700 pg/g-dry.

Stocktaking of the detection of dieldrin in surface water and sediment during FY 2002～2007

Dieldrin	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	41	41	940	3.3	1.8 [0.6]	114/114	38/38
	2003	57	57	510	9.7	0.7 [0.3]	36/36	36/36
	2004	55	51	430	9	2 [0.5]	38/38	38/38
	2005	39	49	630	4.5	1.0 [0.34]	47/47	47/47
	2006	36	32	800	6	3 [1]	48/48	48/48
	2007	38	36	750	3.1	2.1[0.7]	48/48	48/48
Sediment (pg/g-dry)	2002	63	51	2,300	4	3 [1]	189/189	63/63
	2003	59	56	9,100	nd	4 [2]	184/186	62/62
	2004	58	62	3,700	tr(1.9)	3 [0.9]	189/189	63/63
	2005	56	55	4,200	tr(2)	3 [1]	189/189	63/63
	2006	54	54	1,500	tr(1.7)	2.9 [1.0]	192/192	64/64
	2007	42	40	2,700	tr(1.2)	2.7[0.9]	192/192	64/64

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 37～77,000 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 23～1,900 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 560～910 pg/g-wet, and it was concluded that the concentration trend of decrease from 2002 to 2007 was statistically significant.

Stocktaking of the detection of dieldrin in wildlife (bivalves, fish and birds) during FY 2002～2007

Dieldrin	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	490	390	190,000	tr(7)	12 [4]	38/38	8/8
	2003	410	160	78,000	46	4.8 [1.6]	30/30	6/6
	2004	510	270	69,000	42	31 [10]	31/31	7/7
	2005	320	140	39,000	34	9.4 [3.4]	31/31	7/7
	2006	340	120	47,000	30	7 [3]	31/31	7/7
	2007	300	110	77,000	37	9 [3]	31/31	7/7
Fish (pg/g-wet)	2002	280	270	2,400	46	12 [4]	70/70	14/14
	2003	210	200	1,000	29	4.8 [1.6]	70/70	14/14
	2004	240	230	2,800	tr(23)	31 [10]	70/70	14/14
	2005	220	250	1,400	21	9.4 [3.4]	80/80	16/16
	2006	220	220	1,400	19	7 [3]	80/80	16/16
	2007	240	210	1,900	23	9 [3]	80/80	16/16
Birds (pg/g-wet)	2002	1,200	1,100	1,700	820	12 [4]	10/10	2/2
	2003	1,300	1,400	2,200	790	4.8 [1.6]	10/10	2/2
	2004	590	610	960	370	31 [10]	10/10	2/2
	2005	810	740	1,800	500	9.4 [3.4]	10/10	2/2
	2006	700	690	1,300	440	7 [3]	10/10	2/2
	2007	710	710	910	560	9 [3]	10/10	2/2

The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid sites adopting the detection limit of 0.07 pg/m^3, and the detection range was 1.3～310 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.07 pg/m^3, and the detection range was 0.96～75 pg/m^3.

Stocktaking of the detection of dieldrin in air during FY 2002～2007

Dieldrin	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	5.6	5.4	110	0.73	0.60 [0.20]	102/102	34/34
	2003Warm season	19	22	260	2.1	2.1 [0.70]	35/35	35/35
	2003Cold season	5.7	5.2	110	tr(0.82)		34/34	34/34
	2004Warm season	17	22	280	1.1	0.33 [0.11]	37/37	37/37
	2004Cold season	5.5	6.9	76	0.81		37/37	37/37
	2005Warm season	14	12	200	1.5	0.54 [0.24]	37/37	37/37
	2005Cold season	3.9	3.6	50	0.88		37/37	37/37
	2006Warm season	15	14	290	1.5	0.3 [0.1]	37/37	37/37
	2006Cold season	4.5	4.2	250	0.7		37/37	37/37
	2007Warm season	19	22	310	1.3	0.18[0.07]	36/36	36/36
	2007Cold season	4.5	3.7	75	0.96		36/36	36/36

[5] Endrin

- History and state of monitoring

Endrin was used as an insecticide and a rodenticide, but its registration under the Agricultural Chemicals Regulation Law was expired in FY 1975. It was designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in October 1981.

- Monitoring results

The presence of the substance in surface water was monitored at 48 sites, and it was detected at 46 of the 48 valid sites adopting the detection limit of 0.6 pg/L, and none of the detected concentrations exceeded 25 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at 55 of the 64 valid sites adopting the detection limit of 2 pg/g-dry, and none of the detected concentrations exceeded 61,000 pg/g-dry.

Stocktaking of the detection of endrin in surface water and sediment during FY 2002～2007

Endrin	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	tr(4.7)	tr(5.5)	31	nd	6.0 [2.0]	101/114	36/38
	2003	5.7	6.0	78	0.7	0.7 [0.3]	36/36	36/36
	2004	7	7	100	tr(0.7)	2 [0.5]	38/38	38/38
	2005	4.0	4.5	120	nd	1.1 [0.4]	45/47	45/47
	2006	3.1	3.5	26	nd	1.3 [0.4]	44/48	44/48
	2007	3.5	3.4	25	nd	1.9[0.6]	46/48	46/48
Sediment (pg/g-dry)	2002	9	10	19,000	nd	6 [2]	141/189	54/63
	2003	11	11	29,000	nd	5 [2]	150/186	53/62
	2004	13	13	6,900	nd	3 [0.9]	182/189	63/63
	2005	10	11	19,000	nd	2.6 [0.9]	170/189	61/63
	2006	11	10	61,000	nd	4 [1]	178/192	63/64
	2007	9	9	61,000	nd	5[2]	151/192	55/64

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was tr(6)～3,000 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in 15 of the 16 valid areas adopting the detection limit of 3 pg/g-wet, and none of the detected concentrations exceeded 170 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 3 pg/g-wet, and none of the detected concentrations exceeded 55 pg/g-wet.

Stocktaking of the detection of endrin in wildlife (bivalves, fish and birds) during FY 2002～2007

Endrin	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	44	27	12,000	nd	18 [6]	35/38	7/8
	2003	36	21	5,000	6.3	4.8 [1.6]	30/30	6/6
	2004	54	25	4,600	tr(5.7)	12 [4.2]	31/31	7/7
	2005	30	19	2,100	nd	17 [5.5]	27/31	7/7
	2006	37	15	3,100	tr(5)	11 [4]	31/31	7/7
	2007	26	12	3,000	tr(6)	9[3]	31/31	7/7
Fish (pg/g-wet)	2002	19	24	180	nd	18 [6]	54/70	13/14
	2003	14	10	180	nd	4.8 [1.6]	67/70	14/14
	2004	18	24	220	nd	12 [4.2]	57/70	13/14
	2005	tr(16)	tr(16)	2,100	nd	17 [5.5]	58/80	12/16
	2006	13	tr(10)	150	nd	11 [4]	66/80	16/16
	2007	13	12	170	nd	9[3]	69/80	15/16
Birds (pg/g-wet)	2002	22	52	99	nd	18 [6]	7/10	2/2
	2003	21	30	96	5.4	4.8 [1.6]	10/10	2/2
	2004	tr(11)	25	62	nd	12 [4.2]	5/10	1/2
	2005	tr(16)	28	64	nd	17 [5.5]	7/10	2/2
	2006	15	23	57	tr(4)	11 [4]	10/10	2/2
	2007	15	28	55	nd	9[3]	9/10	2/2

The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid sites adopting the detection limit of 0.04 pg/m^3, and the detection range was tr(0.06)～6.3 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at 33 of the 36 valid areas adopting the detection limit of 0.04 pg/m^3, and none of the detected concentrations exceeded 1.5 pg/m^3.

Stocktaking of the detection of endrin in air during FY 2002～2007

Endrin	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Air (pg/m^3)	2002	0.22	0.28	2.5	nd	0.090 [0.030]	90/102	32/34
	2003Warm season	0.74	0.95	6.2	0.081	0.042 [0.014]	35/35	35/35
	2003Cold season	0.23	0.20	2.1	0.042		34/34	34/34
	2004Warm season	0.64	0.68	6.5	tr(0.054)	0.14 [0.048]	37/37	37/37
	2004Cold season	0.23	0.26	1.9	nd		36/37	36/37
	2005Warm season	tr(0.4)	tr(0.3)	2.9	nd	0.5 [0.2]	27/37	27/37
	2005Cold season	nd	nd	0.7	nd		8/37	8/37
	2006Warm season	0.31	0.32	5.4	nd	0.30 [0.10]	32/37	32/37
	2006Cold season	nd	nd	5.0	nd		7/37	7/37
	2007Warm season	0.69	0.73	6.3	tr(0.06)	0.09[0.04]	36/36	36/36
	2007Cold season	0.16	0.13	1.5	nd		33/36	33/36

[6] DDTs

- History and state of monitoring

DDTs, along with hexachlorocyclohexanes (HCHs) and drins, were used as insecticides in high volume. its registration under the Agricultural Chemicals Regulation Law was expired in FY 1971. It was designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in October 1981. Among several DDT isomers with chlorine at various positions on the aromatic ring, not only *p,p′*-DDT and *o,p′*-DDT as active substances but also *p,p′*-DDE, *o,p′*-DDE, *p,p′*-DDD and *o,p′*-DDD as the environmentally degraded products of DDTs have been the target chemicals in monitoring series since FY 1978.

In previous monitoring series, *p,p′*-DDT, *p,p′*-DDE and *p,p′*-DDD had been monitored in wildlife (bivalves, fish and birds) during the period of FY 1978～2001 under the framework of "the Wildlife Monitoring." Under the framework of "the Surface Water/Sediment Monitoring," surface water and sediment had been the monitored media during the period of FY 1986～1998 and FY 1986～2001, respectively. Similarly, *o,p′*-DDT, *o,p′*-DDE and *o,p′*-DDD had been monitored in wildlife (bivalves, fish and birds) during the period of FY 1978～1996 and in FY 1998, FY 2000 and FY 2001 under the framework of "the Wildlife Monitoring." Under the framework of the Environmental Monitoring, *p,p′*-DDT, *p,p′*-DDE, *p,p′*-DDD, *o,p′*-DDT, *o,p′*-DDE and *o,p′*-DDD have been monitored in surface water, sediment, wildlife (bivalves, fish, and birds) and air since FY 2002.

- Monitoring results

○ *p,p′*-DDT, *p,p′*-DDE and *p,p′*-DDD

p,p′-DDT: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 46 of the 48 valid sites adopting the detection limit of 0.6 pg/L, and none of the detected concentrations exceeded 670 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of 0.5 pg/g-dry, and the detection range was 3～130,000 pg/g-dry.

p,p′-DDE: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 2 pg/L, and the detection range was tr(2)～440 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of 0.4 pg/g-dry, and the detection range was 3.2～61,000 pg/g-dry.

p,p′-DDD: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.6 pg/L, and the detection range was tr(1.5)～150 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of 0.4 pg/g-dry, and the detection range was 3.5～80,000 pg/g-dry.

Stocktaking of the detection of *p,p′*-DDT, *p,p′*-DDE and *p,p′*-DDD in surface water and sediment during FY 2002～2007

p,p′-DDT	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	12	11	440	tr(0.25)	0.6 [0.2]	114/114	38/38
	2003	14	12	740	tr(2.8)	3 [0.9]	36/36	36/36
	2004	15	14	310	nd	6 [2]	36/38	36/38
	2005	8	9	110	1	4 [1]	47/47	47/47
	2006	9.1	9.2	170	tr(1.6)	1.9 [0.6]	48/48	48/48
	2007	7.3	9.1	670	nd	1.7[0.6]	46/48	46/48
Sediment (pg/g-dry)	2002	270	240	97,000	tr(5)	6 [2]	189/189	63/63
	2003	240	220	55,000	3	2 [0.4]	186/186	62/62
	2004	330	230	98,000	7	2 [0.5]	189/189	63/63
	2005	280	230	1,700,000	5.1	1.0 [0.34]	189/189	63/63
	2006	260	240	130,000	4.5	1.4 [0.5]	192/192	64/64
	2007	170	150	130,000	3	1.3[0.5]	192/192	64/64
p,p′-DDE	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	24	26	760	1.3	0.6 [0.2]	114/114	38/38
	2003	26	22	380	5	4 [2]	36/36	36/36
	2004	36	34	680	tr(6)	8 [3]	38/38	38/38
	2005	26	24	410	4	6 [2]	47/47	47/47
	2006	24	24	170	tr(4)	7 [2]	48/48	48/48
	2007	22	23	440	tr(2)	4[2]	48/48	48/48
Sediment (pg/g-dry)	2002	660	630	23,000	8.4	2.7 [0.9]	189/189	63/63
	2003	710	780	80,000	9.5	0.9 [0.3]	186/186	62/62
	2004	630	700	39,000	8	3 [0.8]	189/189	63/63
	2005	630	730	64,000	8.4	2.7 [0.94]	189/189	63/63
	2006	640	820	49,000	5.8	1.0 [0.3]	192/192	64/64
	2007	570	900	61,000	3.2	1.1[0.4]	192/192	64/64
p,p′-DDD	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	15	18	190	0.57	0.24 [0.08]	114/114	38/38
	2003	19	18	410	4	2 [0.5]	36/36	36/36
	2004	19	18	740	tr(2.4)	3 [0.8]	38/38	38/38
	2005	17	16	130	tr(1.8)	1.9 [0.64]	47/47	47/47
	2006	16	17	99	2.0	1.6 [0.5]	48/48	48/48
	2007	15	12	150	tr(1.5)	1.7[0.6]	48/48	48/48
Sediment (pg/g-dry)	2002	540	690	51,000	tr(2.2)	2.4 [0.8]	189/189	63/63
	2003	590	580	32,000	3.7	0.9 [0.3]	186/186	62/62
	2004	550	550	75,000	4	2 [0.7]	189/189	63/63
	2005	520	570	210,000	5.2	1.7 [0.64]	189/189	63/63
	2006	490	540	53,000	2.2	0.7 [0.2]	192/192	64/64
	2007	430	550	80,000	3.5	1.0[0.4]	192/192	64/64

p,p′-DDT: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 49～1,200 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 9～1,800 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 160～1,900 pg/g-wet.

p,p′-DDE: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 180～5,600 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 160～22,000 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 6,700～320,000 pg/g-wet.

p,p′-DDD: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 7～1,500 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 36

～4,100 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 70～2,300 pg/g-wet.

Stocktaking of the detection of *p,p'*-DDT, *p,p'*-DDE and *p,p'*-DDD in wildlife (bivalves, fish and birds) during FY 2002～2007

p,p'-DDT	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	200	200	1,200	38	4.2 [1.4]	38/38	8/8
	2003	290	290	1,800	49	11 [3.5]	30/30	6/6
	2004	280	340	2,600	48	3.2 [1.1]	31/31	7/7
	2005	180	170	1,300	66	5.1 [1.7]	31/31	7/7
	2006	210	220	1,100	56	6 [2]	31/31	7/7
	2007	200	150	1,200	49	5[2]	31/31	7/7
Fish (pg/g-wet)	2002	330	450	24,000	6.8	4.2 [1.4]	70/70	14/14
	2003	210	400	1,900	tr(3.7)	11 [3.5]	70/70	14/14
	2004	310	330	53,000	5.5	3.2 [1.1]	70/70	14/14
	2005	250	330	8,400	tr(3.8)	5.1 [1.7]	80/80	16/16
	2006	280	340	3,000	tr(5)	6 [2]	80/80	16/16
	2007	250	320	1,800	9	5[2]	80/80	16/16
Birds (pg/g-wet)	2002	380	510	1,300	76	4.2 [1.4]	10/10	2/2
	2003	540	620	1,400	180	11 [3.5]	10/10	2/2
	2004	330	320	700	160	3.2 [1.1]	10/10	2/2
	2005	410	550	900	180	5.1 [1.7]	10/10	2/2
	2006	420	490	1,800	110	6 [2]	10/10	2/2
	2007	450	350	1,900	160	5[2]	10/10	2/2

p,p'-DDE	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	1,100	1,700	6,000	140	2.4 [0.8]	38/38	8/8
	2003	1,100	1,000	6,500	190	5.7 [1.9]	30/30	6/6
	2004	1,000	1,400	8,400	220	8.2 [2.7]	31/31	7/7
	2005	1,100	1,600	6,600	230	8.5 [2.8]	31/31	7/7
	2006	910	1,200	6,000	160	1.9 [0.7]	31/31	7/7
	2007	980	1,200	5,600	180	3 [1]	31/31	7/7
Fish (pg/g-wet)	2002	2,500	2,200	98,000	510	2.4 [0.8]	70/70	14/14
	2003	2,000	2,200	12,000	180	5.7 [1.9]	70/70	14/14
	2004	2,500	2,100	52,000	390	8.2 [2.7]	70/70	14/14
	2005	2,200	2,400	73,000	230	8.5 [2.8]	80/80	16/16
	2006	2,100	2,600	28,000	280	1.9 [0.7]	80/80	16/16
	2007	2,100	2,000	22,000	160	3 [1]	80/80	16/16
Birds (pg/g-wet)	2002	36,000	60,000	170,000	8,100	2.4 [0.8]	10/10	2/2
	2003	63,000	76,000	240,000	18,000	5.7 [1.9]	10/10	2/2
	2004	34,000	65,000	200,000	6,800	8.2 [2.7]	10/10	2/2
	2005	44,000	86,000	300,000	7,100	8.5 [2.8]	10/10	2/2
	2006	35,000	57,000	160,000	5,900	1.9 [0.7]	10/10	2/2
	2007	38,000	56,000	320,000	6,700	3 [1]	10/10	2/2

p,p'-DDD	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	340	710	3,200	11	5.4 [1.8]	38/38	8/8
	2003	380	640	2,600	tr(7.5)	9.9 [3.3]	30/30	6/6
	2004	300	240	8,900	7.8	2.2 [0.7]	31/31	7/7
	2005	300	800	1,700	13	2.9 [0.97]	31/31	7/7
	2006	240	480	1,400	7.3	2.4 [0.9]	31/31	7/7
	2007	250	360	1,500	7	3[1]	31/31	7/7
Fish (pg/g-wet)	2002	610	680	14,000	80	5.4 [1.8]	70/70	14/14
	2003	500	520	3,700	43	9.9 [3.3]	70/70	14/14
	2004	640	510	9,700	56	2.2 [0.7]	70/70	14/14
	2005	470	650	6,700	29	2.9 [0.97]	80/80	16/16
	2006	500	580	4,300	60	2.4 [0.9]	80/80	16/16
	2007	440	490	4,100	36	3[1]	80/80	16/16
Birds (pg/g-wet)	2002	560	740	3,900	140	5.4 [1.8]	10/10	2/2
	2003	590	860	3,900	110	9.9 [3.3]	10/10	2/2
	2004	310	520	1,400	52	2.2 [0.7]	10/10	2/2
	2005	300	540	1,400	45	2.9 [0.97]	10/10	2/2
	2006	370	740	1,800	55	2.4 [0.9]	10/10	2/2
	2007	430	780	2,300	70	3[1]	10/10	2/2

p,p′-DDT: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 0.6～30 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 0.23～8.8 pg/m^3.

p,p′-DDE: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid sites adopting the detection limit of 0.02 pg/m^3, and the detection range was 0.54～120 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid sites adopting the detection limit of 0.02 pg/m^3, and the detection range was 0.73～39 pg/m^3.

p,p′-DDD: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid sites adopting the detection limit of 0.004 pg/m^3, and the detection range was 0.046～1.4 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid sites adopting the detection limit of 0.004 pg/m^3, and the detection range was 0.026～0.5 pg/m^3.

Stocktaking of the detection of *p,p′*-DDT, *p,p′*-DDE and *p,p′*-DDD in air during FY 2002～2007

p,p′-DDT	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Air (pg/m^3)	2002	1.9	1.8	22	0.25	0.24 [0.08]	102/102	34/34
	2003Warm season	5.8	6.6	24	0.75	0.14 [0.046]	35/35	35/35
	2003Cold season	1.7	1.6	11	0.31		34/34	34/34
	2004Warm season	4.7	5.1	37	0.41	0.22 [0.074]	37/37	37/37
	2004Cold season	1.8	1.7	13	0.29		37/37	37/37
	2005Warm season	4.1	4.2	31	0.44	0.16 [0.054]	37/37	37/37
	2005Cold season	1.1	0.99	4.8	0.25		37/37	37/37
	2006Warm season	4.2	3.8	51	0.35	0.17 [0.06]	37/37	37/37
	2006Cold season	1.4	1.2	7.3	0.29		37/37	37/37
	2007Warm season	4.9	5.2	30	0.6	0.07 [0.03]	36/36	36/36
	2007Cold season	1.2	1.2	8.8	0.23		36/36	36/36
p,p′-DDE	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Air (pg/m^3)	2002	2.8	2.7	28	0.56	0.09 [0.03]	102/102	34/34
	2003Warm season	7.2	7.0	51	1.2	0.40 [0.13]	35/35	35/35
	2003Cold season	2.8	2.4	22	1.1		34/34	34/34
	2004Warm season	6.1	6.3	95	0.62	0.12 [0.039]	37/37	37/37
	2004Cold season	2.9	2.6	43	0.85		37/37	37/37
	2005Warm season	5.0	5.7	42	1.2	0.14 [0.034]	37/37	37/37
	2005Cold season	1.7	1.5	9.9	0.76		37/37	37/37
	2006Warm season	5.0	4.7	49	1.7	0.10 [0.03]	37/37	37/37
	2006Cold season	1.9	1.7	9.5	0.52		37/37	37/37
	2007Warm season	6.4	6.1	120	0.54	0.04[0.02]	36/36	36/36
	2007Cold season	2.1	1.9	39	0.73		36/36	36/36
p,p′-DDD	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Air (pg/m^3)	2002	0.12	0.13	0.76	nd	0.018 [0.006]	101/102	34/34
	2003Warm season	0.30	0.35	1.4	0.063	0.054 [0.018]	35/35	35/35
	2003Cold season	0.13	0.14	0.52	tr(0.037)		34/34	34/34
	2004Warm season	0.24	0.27	1.4	tr(0.036)	0.053 [0.018]	37/37	37/37
	2004Cold season	0.12	0.12	0.91	tr(0.025)		37/37	37/37
	2005Warm season	0.24	0.26	1.3	tr(0.07)	0.16 [0.05]	37/37	37/37
	2005Cold season	tr(0.06)	tr(0.07)	0.29	nd		28/37	28/37
	2006Warm season	0.28	0.32	1.3	nd	0.13 [0.04]	36/37	36/37
	2006Cold season	0.14	tr(0.12)	0.99	nd		36/37	36/37
	2007Warm season	0.26	0.27	1.4	0.046	0.011[0.004]	36/36	36/36
	2007Cold season	0.093	0.087	0.5	0.026		36/36	36/36

- Monitoring results

○ *o,p′*-DDT, *o,p′*-DDE and *o,p′*-DDD

o,p′-DDT: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 38 of the 48 valid sites adopting the detection limit of 0.8 pg/L, and none of the detected concentrations exceeded 86 pg/L, and it was concluded that the concentration trend of decrease from 2002 to 2007 was statistically significant.

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 63 of the 64 valid sites adopting the detection limit of 0.6 pg/g-dry, and none of the detected concentrations exceeded 27,000 pg/g-dry.

o,p′-DDE: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 29 of the 48 valid sites adopting the detection limit of 0.8 pg/L, and none of the detected concentrations exceeded 210 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at 63 of the 64 valid sites adopting the detection limit of 0.4 pg/g-dry, and none of the detected concentrations exceeded 25,000 pg/g-dry.

o,p′-DDD: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.3 pg/L, and the detection range was tr(0.3)～41 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of 0.4 pg/g-dry, and the detection range was tr(0.5)～21,000 pg/g-dry.

Stocktaking of the detection of *o,p′*-DDT, *o,p′*-DDE and *o,p′*-DDD in surface water and sediment during FY 2002～2007

o,p′-DDT	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	5.1	4.6	77	0.19	1.2 [0.4]	114/114	38/38
	2003	6	5	100	tr(1.5)	3 [0.7]	36/36	36/36
	2004	tr(4.5)	5	85	nd	5 [2]	29/38	29/38
	2005	3	3	39	nd	3 [1]	42/47	42/47
	2006	2.8	2.4	52	0.51	2.3 [0.8]	48/48	48/48
	2007	tr(2.1)	tr(2.2)	86	nd	2.5[0.8]	38/48	38/48
Sediment (pg/g-dry)	2002	57	47	27,000	nd	6 [2]	183/189	62/63
	2003	43	43	3,200	nd	0.8 [0.3]	185/186	62/62
	2004	52	50	17,000	tr(1.1)	2 [0.6]	189/189	63/63
	2005	47	46	160,000	0.8	0.8 [0.3]	189/189	63/63
	2006	49	52	18,000	tr(0.8)	1.2 [0.4]	192/192	64/64
	2007	31	31	27,000	nd	1.8[0.6]	186/192	63/64

o,p′-DDE	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	2.3	2.1	680	nd	0.9 [0.3]	113/114	38/38
	2003	2.2	2.0	170	tr(0.42)	0.8 [0.3]	36/36	36/36
	2004	3	2	170	tr(0.6)	2 [0.5]	38/38	38/38
	2005	2.5	2.1	410	0.4	1.2 [0.4]	47/47	47/47
	2006	tr(1.6)	tr(1.4)	210	nd	2.6 [0.9]	28/48	28/48
	2007	tr(1.5)	tr(1.1)	210	nd	2.3[0.8]	29/48	29/48
Sediment (pg/g-dry)	2002	46	37	16,000	nd	3 [1]	188/189	63/63
	2003	43	39	24,000	tr(0.5)	0.6 [0.2]	186/186	62/62
	2004	35	34	28,000	nd	3 [0.8]	184/189	63/63
	2005	35	32	31,000	nd	2.6 [0.9]	181/189	62/63
	2006	37	40	27,000	tr(0.4)	1.1 [0.4]	192/192	64/64
	2007	31	41	25,000	nd	1.2[0.4]	186/192	63/64

o,p′-DDD	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	5.5	6.0	110	nd	0.60 [0.20]	113/114	38/38
	2003	7.1	5.0	160	1.1	0.8 [0.3]	36/36	36/36
	2004	6	5	81	tr(0.7)	2 [0.5]	38/38	38/38
	2005	5.2	5.4	51	tr(0.5)	1.2 [0.4]	47/47	47/47
	2006	2.5	3.3	39	nd	0.8 [0.3]	40/48	40/48
	2007	4.6	3.9	41	tr(0.3)	0.8[0.3]	48/48	48/48
Sediment (pg/g-dry)	2002	140	150	14,000	nd	6 [2]	184/189	62/63
	2003	140	130	8,800	tr(1.0)	2 [0.5]	186/186	62/62
	2004	120	120	16,000	tr(0.7)	2 [0.5]	189/189	63/63
	2005	110	110	32,000	tr(0.8)	1.0 [0.3]	189/189	63/63
	2006	110	110	13,000	tr(0.3)	0.5 [0.2]	192/192	64/64
	2007	97	130	21,000	tr(0.5)	1.0[0.4]	192/192	64/64

o,p'-DDT: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 20～350 pg/g-wet, and it was concluded that the concentration trend of decrease from 2002 to 2007 was statistically significant. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 3～430 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was tr(2)～26 pg/g-wet.

o,p'-DDE: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 0.9 pg/g-wet, and the detection range was 8.9～410 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 0.9 pg/g-wet, and none of the detected concentrations exceeded 4,400 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 0.9 pg/g-wet, and none of the detected concentrations exceeded 2.8 pg/g-wet, and it was concluded that the concentration trend of decrease from 2002 to 2007 was statistically significant.

o,p'-DDD: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 6～1,200 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 1 pg/g-wet, and none of the detected concentrations exceeded 1,300 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 5～10 pg/g-wet, and it was concluded that the concentration trend of decrease from 2002 to 2007 was statistically significant.

Stocktaking of the detection of *o,p'*-DDT, *o,p'*-DDE and *o,p'*-DDD in wildlife (bivalves, fish and birds) during FY 2002～2007

o,p'-DDT	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	100	83	480	22	12 [4]	38/38	8/8
	2003	130	120	480	35	2.9 [0.97]	30/30	6/6
	2004	130	140	910	20	1.8 [0.61]	31/31	7/7
	2005	75	57	440	29	2.6 [0.86]	31/31	7/7
	2006	76	79	380	24	3 [1]	31/31	7/7
	2007	64	52	350	20	3 [1]	31/31	7/7
Fish (pg/g-wet)	2002	110	130	2,300	tr(6)	12 [4]	70/70	14/14
	2003	80	120	520	2.9	2.9 [0.97]	70/70	14/14
	2004	130	140	1,800	3.7	1.8 [0.61]	70/70	14/14
	2005	94	110	1,500	5.8	2.6 [0.86]	80/80	16/16
	2006	91	110	700	6	3 [1]	80/80	16/16
	2007	66	90	430	3	3 [1]	80/80	16/16
Birds (pg/g-wet)	2002	tr(10)	tr(10)	58	nd	12 [4]	8/10	2/2
	2003	18	16	66	8.3	2.9 [0.97]	10/10	2/2
	2004	7.7	13	43	tr(0.9)	1.8 [0.61]	10/10	2/2
	2005	11	14	24	3.4	2.6 [0.86]	10/10	2/2
	2006	10	10	120	3	3 [1]	10/10	2/2
	2007	8	9	26	tr(2)	3 [1]	10/10	2/2

o,p'-DDE	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	88	66	1,100	13	3.6 [1.2]	38/38	8/8
	2003	84	100	460	17	3.6 [1.2]	30/30	6/6
	2004	70	69	360	19	2.1 [0.69]	31/31	7/7
	2005	66	89	470	12	3.4 [1.1]	31/31	7/7
	2006	56	81	340	12	3 [1]	31/31	7/7
	2007	51	69	410	8.9	2.3 [0.9]	31/31	7/7
Fish (pg/g-wet)	2002	77	50	13,000	3.6	3.6 [1.2]	70/70	14/14
	2003	48	54	2,500	nd	3.6 [1.2]	67/70	14/14
	2004	68	48	5,800	tr(0.9)	2.1 [0.69]	70/70	14/14
	2005	50	45	12,000	tr(1.4)	3.4 [1.1]	80/80	16/16
	2006	50	43	4,800	tr(1)	3 [1]	80/80	16/16
	2007	43	29	4,400	nd	2.3 [0.9]	79/80	16/16
Birds (pg/g-wet)	2002	28	26	49	20	3.6 [1.2]	10/10	2/2
	2003	tr(2.0)	tr(2.0)	4.2	nd	3.6 [1.2]	9/10	2/2
	2004	tr(1.0)	tr(1.1)	3.7	nd	2.1 [0.69]	5/10	1/2
	2005	tr(1.4)	tr(1.9)	tr(2.9)	nd	3.4 [1.1]	7/10	2/2
	2006	tr(2)	tr(2)	3	tr(1)	3 [1]	10/10	2/2
	2007	tr(1.1)	tr(1.4)	2.8	nd	2.3 [0.9]	6/10	2/2

o,p'-DDD	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	130	190	2,900	tr(9)	12 [4]	38/38	8/8
	2003	200	220	1,900	6.5	6.0 [2.0]	30/30	6/6
	2004	160	130	2,800	6.0	5.7 [1.9]	31/31	7/7
	2005	140	280	1,800	10	3.3 [1.1]	31/31	7/7
	2006	120	200	1,000	7	4 [1]	31/31	7/7
	2007	130	200	1,200	6	3 [1]	31/31	7/7
Fish (pg/g-wet)	2002	83	90	1,100	nd	12 [4]	66/70	14/14
	2003	73	96	920	nd	6.0 [2.0]	66/70	14/14
	2004	100	96	1,700	nd	5.7 [1.9]	68/70	14/14
	2005	77	81	1,400	nd	3.3 [1.1]	79/80	16/16
	2006	76	86	1,100	tr(1)	4 [1]	80/80	16/16
	2007	63	62	1,300	nd	3 [1]	78/80	16/16
Birds (pg/g-wet)	2002	15	15	23	tr(8)	12 [4]	10/10	2/2
	2003	14	14	36	tr(5.0)	6.0 [2.0]	10/10	2/2
	2004	tr(5.6)	5.7	25	nd	5.7 [1.9]	9/10	2/2
	2005	7.1	7.5	9.7	4.7	3.3 [1.1]	10/10	2/2
	2006	8	8	19	5	4 [1]	10/10	2/2
	2007	7	7	10	5	3 [1]	10/10	2/2

o,p'-DDT: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.01 pg/m^3, and the detection range was 0.24～19 pg/m^3, and it was concluded that the concentration trend of decrease from 2003 to 2007 was statistically significant. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.01 pg/m^3, and the detection range was 0.31～3.4 pg/m^3, and it was concluded that the concentration trend of decrease from 2003 to 2007 was statistically significant.

o,p'-DDE: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.007 pg/m^3, and the detection range was 0.096～7 pg/m^3, and it was concluded that the concentration trend of decrease from 2003 to 2007 was statistically significant. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.007 pg/m^3, and the detection range was 0.12～3.7 pg/m^3.

o,p'-DDD: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.05 pg/m^3, and the detection range was 0.05～1.9 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.05 pg/m^3, and the detection range was tr(0.03)～0.33 pg/m^3.

Stocktaking of the detection of *o,p'*-DDT, *o,p'*-DDE and *o,p'*-DDD in air during FY 2002～2007

o,p'-DDT	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Air (pg/m^3)	2002	2.2	2.0	40	0.41	0.15 [0.05]	102/102	34/34
	2003Warm season	6.9	7.7	38	0.61	0.12 [0.040]	35/35	35/35
	2003Cold season	1.6	1.4	6.4	0.43		34/34	34/34
	2004Warm season	5.1	5.4	22	0.54	0.093 [0.031]	37/37	37/37
	2004Cold season	1.5	1.4	9.4	0.35		37/37	37/37
	2005Warm season	3.0	3.1	14	0.67	0.10 [0.034]	37/37	37/37
	2005Cold season	0.76	0.67	3.0	0.32		37/37	37/37
	2006Warm season	2.5	2.4	20	0.55	0.09 [0.03]	37/37	37/37
	2006Cold season	0.90	0.79	3.9	0.37		37/37	37/37
	2007Warm season	2.9	2.6	19	0.24	0.03[0.01]	36/36	36/36
	2007Cold season	0.77	0.63	3.4	0.31		36/36	36/36
o,p'-DDE	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Air (pg/m^3)	2002	0.60	0.56	8.5	0.11	0.03 [0.01]	102/102	34/34
	2003Warm season	1.4	1.5	7.5	0.17	0.020 [0.0068]	35/35	35/35
	2003Cold season	0.50	0.47	1.7	0.18		34/34	34/34
	2004Warm season	1.1	1.2	8.9	0.14	0.037 [0.012]	37/37	37/37
	2004Cold season	0.53	0.49	3.9	0.14		37/37	37/37
	2005Warm season	1.6	1.5	7.9	0.33	0.074 [0.024]	37/37	37/37
	2005Cold season	0.62	0.59	2.0	0.24		37/37	37/37
	2006Warm season	1.1	1.1	7.4	nd	0.09 [0.03]	36/37	36/37
	2006Cold season	0.65	0.56	2.6	0.19		37/37	37/37
	2007Warm season	0.66	0.67	7	0.096	0.017[0.007]	36/36	36/36
	2007Cold season	0.3	0.29	3.7	0.12		36/36	36/36
o,p'-DDD	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Air (pg/m^3)	2002	0.14	0.18	0.85	nd	0.021 [0.007]	97/102	33/34
	2003Warm season	0.37	0.42	1.3	0.059	0.042 [0.014]	35/35	35/35
	2003Cold season	0.15	0.14	0.42	0.062		34/34	34/34
	2004Warm season	0.31	0.33	2.6	tr(0.052)	0.14 [0.048]	37/37	37/37
	2004Cold season	0.14	tr(0.13)	0.86	nd		35/37	35/37
	2005Warm season	0.22	0.19	0.90	tr(0.07)	0.10 [0.03]	37/37	37/37
	2005Cold season	tr(0.07)	tr(0.07)	0.21	nd		35/37	35/37
	2006Warm season	0.28	0.28	1.4	tr(0.05)	0.10 [0.03]	37/37	37/37
	2006Cold season	0.12	0.11	0.79	nd		34/37	34/37
	2007Warm season	0.28	0.29	1.9	0.05	0.02[0.05]	36/36	36/36
	2007Cold season	0.095	0.09	0.33	tr(0.03)		36/36	36/36

[7] Chlordanes

- History and state of monitoring

Chlordanes were used as insecticides, but its registration under the Agricultural Chemicals Regulation Law was expired in FY 1968. Because the substance was detected in sediment and fish at wide-ranging sites in "the High-Precision Environmental Survey" in FY 1982, it has been a target group of chemicals under the framework of "the Wildlife Monitoring" since FY 1983. The substance was designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in September 1986 because of its properties such as persistency, since it had been used as termitecides for wood products such as primary processed timber, plywood and house. Although manufactured chlordanes have complicated compositions, heptachlor, γ -chlordane, heptachlor epoxide, *cis*-chlordane, *trans*-chlordane, oxychlordane (as a chlordane metabolite), *cis*-nonachlor (not registrated as an Agricultural Chemical) and *trans*-nonachlor (not registrated as an Agricultural Chemical) were the original target chemicals in monitoring series. Since FY 1983, 5 of those 8 chemicals (*cis*-chlordane, *trans*-chlordane, oxychlordane, *cis*-nonachlor and *trans*-nonachlor) have been the target chemicals owning to their high detection frequency in the FY 1982 High-Pre*cis*ion Environmental Survey.

In previous monitoring series under the framework of "the Wildlife Monitoring" during the period of FY 1983～2001. Under the framework of "the Surface Water/Sediment Monitoring", *cis*-chlordane, *trans*-chlordane, *cis*-nonachlor and *trans*-nonachlor in surface water and sediment have been the monitored during the period of FY 1986～1998 and FY 1986～2001, respectively. Under the framework of the Environmental Monitoring, had been monitored in surface water, sediment , wildlife (bivalves, fish and birds) and air since FY 2002.

- Monitoring results

○ *cis*-Chlordane and *trans*-Chlordane

cis-Chlordane: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 47 of the 48 valid sites adopting the detection limit of 2 pg/L, and none of the detected concentrations exceeded 680 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of 2 pg/g-dry, and none of the detected concentrations exceeded 7,500 pg/g-dry.

trans-Chlordane: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 47 of the 48 valid sites adopting the detection limit of 0.8 pg/L, and none of the detected concentrations exceeded 580 pg/L, and it was concluded that the concentration trend of decrease from 2002 to 2007 was statistically significant. The presence of the substance in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of 0.8 pg/g-dry, and none of the detected concentrations exceeded 7,500 pg/g-dry, and it was concluded that the concentration trend of decrease from 2002 to 2007 was statistically significant.

Stocktaking of the detection of *cis*-chlordane and *trans*-chlordane in surface water and sediment during FY 2002～2007

cis-Chlordane	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	41	32	880	2.5	0.9 [0.3]	114/114	38/38
	2003	69	51	920	12	3 [0.9]	36/36	36/36
	2004	92	87	1,900	10	6 [2]	38/38	38/38
	2005	53	54	510	6	4 [1]	47/47	47/47
	2006	31	26	440	5	5 [2]	48/48	48/48
	2007	23	22	680	nd	4[2]	47/48	47/48
Sediment (pg/g-dry)	2002	120	98	18,000	1.8	0.9 [0.3]	189/189	63/63
	2003	170	140	19,000	tr(3.6)	4 [2]	186/186	62/62
	2004	140	97	36,000	4	4 [2]	189/189	63/63
	2005	140	100	44,000	3.3	1.9 [0.64]	189/189	63/63
	2006	90	70	13,000	tr(0.9)	2.4 [0.8]	192/192	64/64
	2007	73	55	7,500	nd	5[2]	191/192	64/64

trans-Chlordane	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	32	24	780	3.1	1.5 [0.5]	114/114	38/38
	2003	34	30	410	6	5 [2]	36/36	36/36
	2004	32	26	1,200	5	5 [2]	38/38	38/38
	2005	25	21	200	3	4 [1]	47/47	47/47
	2006	24	16	330	tr(4)	7 [2]	48/48	48/48
	2007	16	20	580	nd	2.4[0.8]	47/48	47/48
Sediment (pg/g-dry)	2002	130	110	16,000	2.1	1.8 [0.6]	189/189	63/63
	2003	120	100	13,000	tr(2.4)	4 [2]	186/186	62/62
	2004	95	80	26,000	3	3 [0.9]	189/189	63/63
	2005	98	81	32,000	3.4	2.3 [0.84]	189/189	63/63
	2006	98	76	12,000	2.2	1.1 [0.4]	192/192	64/64
	2007	72	58	7,500	nd	2.2[0.8]	191/192	64/64

cis-Chlordane: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 59～19,000 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 30～5,200 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was tr(4)～230 pg/g-wet.

trans-Chlordane: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 34～1,500 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 8～2,100 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was tr(3)～19 pg/g-wet.

Stocktaking of the detection of *cis*-chlordane and *trans*-chlordane in wildlife (bivalves, fish and birds) during FY 2002～2007

cis-Chlordane	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	810	1,200	26,000	24	2.4 [0.8]	38/38	8/8
	2003	1,100	1,400	14,000	110	3.9 [1.3]	30/30	6/6
	2004	1,200	1,600	14,000	91	18 [5.8]	31/31	7/7
	2005	820	960	13,000	78	12 [3.9]	31/31	7/7
	2006	810	1,100	18,000	67	4 [1]	31/31	7/7
	2007	760	590	19,000	59	5 [2]	31/31	7/7
Fish (pg/g-wet)	2002	580	550	6,900	57	2.4 [0.8]	70/70	14/14
	2003	490	400	4,400	43	3.9 [1.3]	70/70	14/14
	2004	580	490	9,800	68	18 [5.8]	70/70	14/14
	2005	490	600	8,000	42	12 [3.9]	80/80	16/16
	2006	490	420	4,900	56	4 [1]	80/80	16/16
	2007	410	360	5,200	30	5 [2]	80/80	16/16
Birds (pg/g-wet)	2002	67	180	450	10	2.4 [0.8]	10/10	2/2
	2003	47	120	370	6.8	3.9 [1.3]	10/10	2/2
	2004	39	110	240	tr(5.8)	18 [5.8]	10/10	2/2
	2005	49	120	340	tr(5.8)	12 [3.9]	10/10	2/2
	2006	32	83	250	5	4 [1]	10/10	2/2
	2007	30	83	230	tr(4)	5 [2]	10/10	2/2

trans-Chlordane	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	420	840	2,300	33	2.4 [0.8]	38/38	8/8
	2003	550	840	2,800	69	7.2 [2.4]	30/30	6/6
	2004	510	770	2,800	53	48 [16]	31/31	7/7
	2005	370	660	2,400	40	10 [3.5]	31/31	7/7
	2006	370	580	2,800	41	4 [2]	31/31	7/7
	2007	360	460	1,500	34	6 [2]	31/31	7/7
Fish (pg/g-wet)	2002	180	160	2,700	20	2.4 [0.8]	70/70	14/14
	2003	150	120	1,800	9.6	7.2 [2.4]	70/70	14/14
	2004	190	130	5,200	tr(17)	48 [16]	70/70	14/14
	2005	150	180	3,100	tr(9.8)	10 [3.5]	76/80	16/16
	2006	150	120	2,000	14	4 [2]	80/80	16/16
	2007	120	100	2,100	8	6 [2]	80/80	16/16
Birds (pg/g-wet)	2002	14	14	26	8.9	2.4 [0.8]	10/10	2/2
	2003	11	12	27	tr(5.9)	7.2 [2.4]	10/10	2/2
	2004	tr(14)	tr(11)	tr(26)	nd	48 [16]	5/10	1/2
	2005	10	12	30	tr(4.5)	10 [3.5]	10/10	2/2
	2006	7	8	17	tr(3)	4 [2]	10/10	2/2
	2007	7	8	19	tr(3)	6 [2]	10/10	2/2

cis-Chlordane: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.04 pg/m^3, and the detection range was 3.3～1,100 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.04 pg/m^3, and the detection range was 1.4～230 pg/m^3.

trans-Chlordane: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.05 pg/m^3, and the detection range was 3.8～1,300 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.05 pg/m^3, and the detection range was 1.5～300 pg/m^3. All the values in the warm season were higher than corresponding values in the cold season.

Stocktaking of the detection of *cis*-chlordane and *trans*-chlordane in air during FY 2002～2007

cis-Chlordane	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	31	40	670	0.86	0.60 [0.20]	102/102	34/34
	2003Warm season	110	120	1,600	6.4	0.51 [0.17]	35/35	35/35
	2003Cold season	30	38	220	2.5		34/34	34/34
	2004Warm season	92	160	1,000	2.3	0.57 [0.19]	37/37	37/37
	2004Cold season	29	49	290	1.2		37/37	37/37
	2005Warm season	92	120	1,000	3.4	0.16 [0.054]	37/37	37/37
	2005Cold season	16	19	260	1.4		37/37	37/37
	2006Warm season	82	110	760	2.9	0.13 [0.04]	37/37	37/37
	2006Cold season	19	19	280	2.0		37/37	37/37
	2007Warm season	90	120	1,100	3.3	0.10[0.04]	36/36	36/36
	2007Cold season	17	20	230	1.4		36/36	36/36

trans-Chlordane	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	36	48	820	0.62	0.60 [0.20]	102/102	34/34
	2003Warm season	130	150	2,000	6.5	0.86 [0.29]	35/35	35/35
	2003Cold season	37	44	290	2.5		34/34	34/34
	2004Warm season	110	190	1,300	2.2	0.69 [0.23]	37/37	37/37
	2004Cold season	35	60	360	1.5		37/37	37/37
	2005Warm season	100	130	1,300	3.2	0.34 [0.14]	37/37	37/37
	2005Cold season	19	23	310	1.9		37/37	37/37
	2006Warm season	96	140	1,200	3.4	0.17 [0.06]	37/37	37/37
	2006Cold season	22	21	350	2.0		37/37	37/37
	2007Warm season	100	140	1,300	3.8	0.12[0.05]	36/36	36/36
	2007Cold season	20	24	300	1.5		36/36	36/36

- Monitoring results

○ Oxychlordane, *cis*-Nonachlor and *trans*-Nonachlor

Oxychlordane: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 25 of the 48 valid sites adopting the detection limit of 2 pg/L, and none of the detected concentrations exceeded 41 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at 46 of the 64 valid sites adopting the detection limit of 0.9 pg/g-dry, and none of the detected concentrations exceeded 76 pg/g-dry.

cis-Nonachlor: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 43 of the 48 valid sites adopting the detection limit of 0.8 pg/L, and none of the detected concentrations exceeded 210 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of 0.6 pg/g-dry, and none of the detected concentrations exceeded 4,200 pg/g-dry.

trans-Nonachlor: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 2 pg/L, and the detection range was tr(2)～540 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of 0.6 pg/g-dry, and the detection range was tr(1.6)～8,400 pg/g-dry.

Stocktaking of the detection of oxychlordane, *cis*-nonachlor and *trans*-nonachlor in surface water and sediment during FY 2002～2007

Oxychlordane	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	2.4	3.5	41	nd	1.2 [0.4]	96/114	35/38
	2003	3	2	39	tr(0.6)	2 [0.5]	36/36	36/36
	2004	3.2	2.9	47	tr(0.7)	2 [0.5]	38/38	38/38
	2005	2.6	2.1	19	nd	1.1 [0.4]	46/47	46/47
	2006	tr(2.5)	tr(2.4)	18	nd	2.8 [0.9]	43/48	43/48
	2007	tr(2)	nd	41	nd	6[2]	25/48	25/48
Sediment (pg/g-dry)	2002	2.2	1.7	120	nd	1.5 [0.5]	153/189	59/63
	2003	2	2	85	nd	1 [0.4]	158/186	57/62
	2004	tr(2.0)	tr(1.3)	140	nd	3 [0.8]	129/189	54/63
	2005	2.1	tr(1.9)	160	nd	2.0 [0.7]	133/189	51/63
	2006	tr(2.4)	tr(1.7)	280	nd	2.9 [1.0]	141/192	54/64
	2007	tr(1.8)	tr(1.5)	76	nd	2.5[0.9]	117/192	46/64
cis-Nonachlor	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	7.6	6.7	250	0.23	1.8 [0.6]	114/114	38/38
	2003	8.0	7.0	130	1.3	0.3 [0.1]	36/36	36/36
	2004	7.5	6.3	340	0.8	0.6 [0.2]	38/38	38/38
	2005	6.0	5.9	43	0.9	0.5 [0.2]	47/47	47/47
	2006	6.6	5.6	83	1.0	0.8 [0.3]	48/48	48/48
	2007	5.9	6.1	210	nd	2.4[0.8]	43/48	43/48
Sediment (pg/g-dry)	2002	65	66	7,800	nd	2.1 [0.7]	188/189	63/63
	2003	59	50	6,500	nd	3 [0.9]	184/186	62/62
	2004	46	34	9,400	tr(0.8)	2 [0.6]	189/189	63/63
	2005	50	42	9,900	tr(1.1)	1.9 [0.64]	189/189	63/63
	2006	52	48	5,800	tr(0.6)	1.2 [0.4]	192/192	64/64
	2007	43	35	4,200	nd	1.6[0.6]	191/192	64/64
trans-Nonachlor	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	29	24	780	1.8	1.2 [0.4]	114/114	38/38
	2003	26	20	450	4	2 [0.5]	36/36	36/36
	2004	25	19	1,100	tr(3)	4 [2]	38/38	38/38
	2005	20	17	150	2.6	2.5 [0.84]	47/47	47/47
	2006	21	16	310	3.2	3.0 [1.0]	48/48	48/48
	2007	17	17	540	tr(2)	5[2]	48/48	48/48
Sediment (pg/g-dry)	2002	120	83	13,000	3.1	1.5 [0.5]	189/189	63/63
	2003	100	78	11,000	2	2 [0.6]	186/186	62/62
	2004	83	63	23,000	3	2 [0.6]	189/189	63/63
	2005	89	72	24,000	2.4	1.5 [0.54]	189/189	63/63
	2006	91	65	10,000	3.4	1.2 [0.4]	192/192	64/64
	2007	70	55	8,400	tr(1.6)	1.7[0.6]	192/192	64/64

Oxychlordane: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 8～2,200 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 17～1,900 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 290～740 pg/g-wet, and it was concluded that the concentration trend of decrease from 2002 to 2007 was statistically significant.

cis-Nonachlor: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 26～1,000 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 16～3,700 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 42～300 pg/g-wet.

trans-Nonachlor: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 71～2,400 pg/g-wet. For fish, the substance was

monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 71～7,900 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 200～1,400 pg/g-wet.

Stocktaking of the detection of oxychlordane, *cis*-nonachlor and *trans*-nonachlor in wildlife (bivalves, fish and birds) during FY 2002～2007

Oxychlordane	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	76	83	5,600	nd	3.6 [1.2]	37/38	8/8
	2003	90	62	1,900	11	8.4 [2.8]	30/30	6/6
	2004	110	100	1,700	14	9.2 [3.1]	31/31	7/7
	2005	81	79	1,400	12	9.3 [3.1]	31/31	7/7
	2006	77	90	2,400	7	7 [3]	31/31	7/7
	2007	62	43	2,200	8	6 [2]	31/31	7/7
Fish (pg/g-wet)	2002	160	140	3,900	16	3.6 [1.2]	70/70	14/14
	2003	140	160	820	30	8.4 [2.8]	70/70	14/14
	2004	150	140	1,500	25	9.2 [3.1]	70/70	14/14
	2005	140	150	1,900	20	9.3 [3.1]	80/80	16/16
	2006	140	120	3,000	28	7 [3]	80/80	16/16
	2007	120	100	1,900	17	6 [2]	80/80	16/16
Birds (pg/g-wet)	2002	640	630	890	470	3.6 [1.2]	10/10	2/2
	2003	750	700	1,300	610	8.4 [2.8]	10/10	2/2
	2004	460	450	730	320	9.2 [3.1]	10/10	2/2
	2005	600	660	860	390	9.3 [3.1]	10/10	2/2
	2006	500	560	720	270	7 [3]	10/10	2/2
	2007	440	400	740	290	6 [2]	10/10	2/2

cis-Nonachlor	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	190	300	870	8.6	1.2 [0.4]	38/38	8/8
	2003	290	260	1,800	48	4.8 [1.6]	30/30	6/6
	2004	280	380	1,800	43	3.4 [1.1]	31/31	7/7
	2005	220	220	1,300	27	4.5 [1.5]	31/31	7/7
	2006	210	180	1,500	31	3 [1]	31/31	7/7
	2007	210	250	1,000	26	3 [1]	31/31	7/7
Fish (pg/g-wet)	2002	420	420	5,100	46	1.2 [0.4]	70/70	14/14
	2003	350	360	2,600	19	4.8 [1.6]	70/70	14/14
	2004	410	310	10,000	48	3.4 [1.1]	70/70	14/14
	2005	360	360	6,200	27	4.5 [1.5]	80/80	16/16
	2006	360	330	3,300	33	3 [1]	80/80	16/16
	2007	310	280	3,700	16	3 [1]	80/80	16/16
Birds (pg/g-wet)	2002	200	240	450	68	1.2 [0.4]	10/10	2/2
	2003	200	260	660	68	4.8 [1.6]	10/10	2/2
	2004	130	150	240	73	3.4 [1.1]	10/10	2/2
	2005	160	180	370	86	4.5 [1.5]	10/10	2/2
	2006	120	130	270	60	3 [1]	10/10	2/2
	2007	120	140	300	42	3 [1]	10/10	2/2

trans-Nonachlor	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	510	1,100	1,800	21	2.4 [0.8]	38/38	8/8
	2003	780	700	3,800	140	3.6 [1.2]	30/30	6/6
	2004	710	870	3,400	110	13 [4.2]	31/31	7/7
	2005	570	650	3,400	72	6.2 [2.1]	31/31	7/7
	2006	530	610	3,200	85	3 [1]	31/31	7/7
	2007	540	610	2,400	71	7 [3]	31/31	7/7
Fish (pg/g-wet)	2002	970	900	8,300	98	2.4 [0.8]	70/70	14/14
	2003	880	840	5,800	85	3.6 [1.2]	70/70	14/14
	2004	1,000	760	21,000	140	13 [4.2]	70/70	14/14
	2005	910	750	13,000	80	6.2 [2.1]	80/80	16/16
	2006	910	680	6,900	120	3 [1]	80/80	16/16
	2007	780	680	7,900	71	7 [3]	80/80	16/16
Birds (pg/g-wet)	2002	880	980	1,900	350	2.4 [0.8]	10/10	2/2
	2003	1,100	1,400	3,700	350	3.6 [1.2]	10/10	2/2
	2004	680	780	1,200	390	13 [4.2]	10/10	2/2
	2005	850	880	2,000	440	6.2 [2.1]	10/10	2/2
	2006	630	620	1,500	310	3 [1]	10/10	2/2
	2007	590	680	1,400	200	7 [3]	10/10	2/2

Oxychlordane: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.02 pg/m^3, and the detection range was 0.56～8.6 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.02 pg/m^3, and the detection range was 0.26～2.4 pg/m^3, and it was concluded that the concentration trend of decrease from 2003 to 2007 was statistically significant.

cis-Nonachlor: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.01 pg/m^3, and the detection range was 0.31～150 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.01 pg/m^3, and the detection range was 0.09～22 pg/m^3.

trans-Nonachlor: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.03 pg/m^3, and the detection range was 2.5～940 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.03 pg/m^3, and the detection range was 1.1～190 pg/m^3.

Stocktaking of the detection of oxychlordane, *cis*-nonachlor and *trans*-nonachlor in air during FY 2002～2007

Oxychlordane	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	0.96	0.98	8.3	nd	0.024 [0.008]	101/102	34/34
	2003Warm season	2.5	2.7	12	0.41	0.045 [0.015]	35/35	35/35
	2003Cold season	0.87	0.88	3.2	0.41		34/34	34/34
	2004Warm season	1.9	2.0	7.8	0.41	0.13 [0.042]	37/37	37/37
	2004Cold season	0.80	0.76	3.9	0.27		37/37	37/37
	2005Warm season	1.9	2.0	8.8	0.65	0.16 [0.054]	37/37	37/37
	2005Cold season	0.55	0.50	2.2	0.27		37/37	37/37
	2006Warm season	1.8	1.9	5.7	0.47	0.23 [0.08]	37/37	37/37
	2006Cold season	0.54	0.56	5.1	tr(0.13)		37/37	37/37
	2007Warm season	1.9	1.8	8.6	0.56	0.05[0.02]	36/36	36/36
	2007Cold season	0.61	0.63	2.4	0.26		36/36	36/36
cis-Nonachlor	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	3.1	4.0	62	0.071	0.030 [0.010]	102/102	34/34
	2003Warm season	12	15	220	0.81	0.026 [0.0088]	35/35	35/35
	2003Cold season	2.7	3.5	23	0.18		34/34	34/34
	2004Warm season	10	15	130	0.36	0.072 [0.024]	37/37	37/37
	2004Cold season	2.7	4.4	28	0.087		37/37	37/37
	2005Warm season	10	14	160	0.30	0.08 [0.03]	37/37	37/37
	2005Cold season	1.6	1.6	34	0.08		37/37	37/37
	2006Warm season	11	12	170	0.28	0.15 [0.05]	37/37	37/37
	2006Cold season	2.4	2.0	41	tr(0.14)		37/37	37/37
	2007Warm season	10	14	150	0.31	0.03[0.01]	36/36	36/36
	2007Cold season	1.6	1.7	22	0.09		36/36	36/36
trans-Nonachlor	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	24	30	550	0.64	0.30 [0.10]	102/102	34/34
	2003Warm season	87	100	1,200	5.1	0.35 [0.12]	35/35	35/35
	2003Cold season	24	28	180	2.1		34/34	34/34
	2004Warm season	72	120	870	1.9	0.48 [0.16]	37/37	37/37
	2004Cold season	23	39	240	0.95		37/37	37/37
	2005Warm season	75	95	870	3.1	0.13 [0.044]	37/37	37/37
	2005Cold season	13	16	210	1.2		37/37	37/37
	2006Warm season	68	91	800	3.0	0.10 [0.03]	37/37	37/37
	2006Cold season	16	15	240	1.4		37/37	37/37
	2007Warm season	72	96	940	2.5	0.09[0.03]	36/36	36/36
	2007Cold season	13	15	190	1.1		36/36	36/36

[8] Heptachlors

- History and state of monitoring

Heptachlor and its metabolite, heptachlor epoxide, are a group of organochlorine insecticides applied for agricultural crops such as rice, wheat, barley, potato, sweet potato, tobacco, beans, cruciferous vegetables, alliaceous vegetables, cucurbitaceous vegetables, sugar beet and spinach. The substances were not reregistrated under the Agricultural Chemicals Regulation Law in FY 1975. The substances were designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in September 1986, since it includes the technical chlordane used as a termitecide.

In previous monitoring series before FY 2001, heptachlor and heptachlor epoxide were measured in FY 1982 (in surface water, sediment and fish) and in FY 1986 (in air) under the framework of "the Environmental Survey and Monitoring of Chemicals."

- Monitoring results

Heptachlor: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 12 of the 48 valid sites adopting the detection limit of 0.8 pg/L, and none of the detected concentrations exceeded 5.2 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at 57 of the 64 valid sites adopting the detection limit of 0.7 pg/g-dry, and none of the detected concentrations exceeded 110 pg/g-dry.

cis-Heptachlor epoxide: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.4 pg/L, and the detection range was tr(0.9)～120 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at 53 of the 64 valid sites adopting the detection limit of 1 pg/g-dry, and none of the detected concentrations exceeded 270 pg/g-dry.

trans-Heptachlor epoxide: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 2 of the 48 valid sites adopting the detection limit of 0.7 pg/L, and none of the detected concentrations exceeded tr(0.9) pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at 2 of 64 valid sites adopting the detection limit of 4 pg/g-dry, and none of the detected concentrations exceeded 31 pg/g-dry.

Stocktaking of the detection of heptachlor, *cis*-heptachlor epoxide, and *trans*-heptachlor epoxide in surface water and sediment during FY 2002～2007

Heptachlor	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	tr(1.1)	1.0	25	nd	1.5 [0.5]	97/114	38/38
	2003	tr(1.8)	tr(1.6)	7	tr(1.0)	2 [0.5]	36/36	36/36
	2004	nd	nd	29	nd	5 [2]	9/38	9/38
	2005	nd	tr(1)	54	nd	3 [1]	25/47	25/47
	2006	nd	nd	6	nd	5 [2]	5/48	5/48
	2007	nd	nd	5.2	nd	2.4[0.8]	12/48	12/48
Sediment (pg/g-dry)	2002	3.5	3.2	120	nd	1.8 [0.6]	167/189	60/63
	2003	tr(2.4)	tr(2.2)	160	nd	3 [1]	138/186	53/62
	2004	tr(2.5)	tr(2.3)	170	nd	3 [0.9]	134/189	53/63
	2005	2.5	2.8	200	nd	2.5 [0.8]	120/189	48/63
	2006	4.6	3.9	230	nd	1.9 [0.6]	190/192	64/64
	2007	tr(1.7)	tr(1.5)	110	nd	3[0.7]	143/192	57/64
cis- Heptachlor epoxide	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2003	9.8	11	170	1.2	0.7 [0.2]	36/36	36/36
	2004	10	10	77	2	2 [0.4]	38/38	38/38
	2005	7.1	6.6	59	1.0	0.7 [0.2]	47/47	47/47
	2006	7.6	6.6	47	1.1	2.0 [0.7]	48/48	48/48
	2007	6.1	5.8	120	tr(0.9)	1.3[0.4]	48/48	48/48
Sediment (pg/g-dry)	2003	4	3	160	nd	3 [1]	153/186	55/62
	2004	tr(4.4)	tr(3.0)	230	nd	6 [2]	136/189	52/63
	2005	tr(4)	tr(3)	140	nd	7 [2]	119/189	49/63
	2006	3.7	3.2	210	nd	3.0 [1.0]	157/192	58/64
	2007	3	tr(2)	270	nd	3[1]	141/192	53/64
trans- Heptachlor epoxide	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2003	nd	nd	2	nd	2 [0.4]	4/36	4/36
	2004	nd	nd	nd	nd	0.9 [0.3]	0/38	0/38
	2005	nd	nd	nd	nd	0.7 [0.2]	0/47	0/47
	2006	nd	nd	nd	nd	1.8 [0.6]	0/48	0/48
	2007	nd	nd	tr(0.9)	nd	2.0[0.7]	2/48	2/48
Sediment (pg/g-dry)	2003	nd	nd	nd	nd	9 [3]	0/186	0/62
	2004	nd	nd	tr(2.5)	nd	4 [2]	1/189	1/63
	2005	nd	nd	nd	nd	5 [2]	0/189	0/63
	2006	nd	nd	19	nd	7 [2]	2/192	2/64
	2007	nd	nd	31	nd	10[4]	2/192	2/64

Heptachlor: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 6 of the 7 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded 12 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in 6 of the 16 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded 7 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in none of 2 valid areas adopting the detection limit of 2 pg/g-wet.

cis-Heptachlor epoxide: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 8～1,100 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 4～390 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 250～350 pg/g-wet, and it was concluded that the concentration trend of decrease from 2003 to 2007 was statistically significant.

trans-Heptachlor epoxide: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 1 of the 7 valid areas adopting the detection limit of 5 pg/g-wet, and none of the detected concentrations exceeded 61 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in none of 16 valid areas adopting the detection limit of 5 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in none of 2 valid areas adopting the detection limit of 5 pg/g-wet.

Stocktaking of the detection of heptachlor, *cis*-heptachlor epoxide, and *trans*-heptachlor epoxide in wildlife (bivalves, fish and birds) during FY 2002～2007

Heptachlor	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	3.6	4.6	15	nd	4.2 [1.4]	28/38	6/8
	2003	tr(2.8)	tr(2.4)	14	nd	6.6 [2.2]	16/30	4/6
	2004	tr (3.5)	5.2	16	nd	4.1 [1.4]	23/31	6/7
	2005	tr(2.3)	tr(2.9)	24	nd	6.1 [2.0]	18/31	6/7
	2006	tr(3)	tr(4)	20	nd	6 [2]	23/31	6/7
	2007	tr(3)	tr(3)	12	nd	6 [2]	20/31	6/7
Fish (pg/g-wet)	2002	4.0	4.8	20	nd	4.2 [1.4]	57/70	12/14
	2003	nd	nd	11	nd	6.6 [2.2]	29/70	8/14
	2004	tr(1.9)	tr(2.1)	460	nd	4.1 [1.4]	50/70	11/14
	2005	nd	nd	7.6	nd	6.1 [2.0]	32/80	8/16
	2006	tr(2)	nd	8	nd	6 [2]	36/80	8/16
	2007	nd	nd	7	nd	6 [2]	28/80	6/16
Birds (pg/g-wet)	2002	tr(2.1)	tr(2.8)	5.2	nd	4.2 [1.4]	7/10	2/2
	2003	nd	nd	nd	nd	6.6 [2.2]	0/10	0/2
	2004	nd	nd	tr(1.5)	nd	4.1 [1.4]	1/10	1/2
	2005	nd	nd	nd	nd	6.1 [2.0]	0/10	0/2
	2006	nd	nd	nd	nd	6 [2]	0/10	0/2
	2007	nd	nd	nd	nd	6 [2]	0/10	0/2
cis- Heptachlor epoxide	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2003	42	29	880	9.7	6.9 [2.3]	30/30	6/6
	2004	57	34	840	tr(9.8)	9.9 [3.3]	31/31	7/7
	2005	36	20	590	7.4	3.5 [1.2]	31/31	7/7
	2006	44	23	1,100	8	4 [1]	31/31	7/7
	2007	30	20	1,100	8	4 [1]	31/31	7/7
Fish (pg/g-wet)	2003	42	43	320	7.0	6.9 [2.3]	70/70	14/14
	2004	46	49	620	tr(3.3)	9.9 [3.3]	70/70	14/14
	2005	39	45	390	4.9	3.5 [1.2]	80/80	16/16
	2006	40	48	270	4	4 [1]	80/80	16/16
	2007	41	49	390	4	4 [1]	80/80	16/16
Birds (pg/g-wet)	2003	520	510	770	370	6.9 [2.3]	10/10	2/2
	2004	270	270	350	190	9.9 [3.3]	10/10	2/2
	2005	360	340	690	250	3.5 [1.2]	10/10	2/2
	2006	320	310	650	240	4 [1]	10/10	2/2
	2007	280	270	350	250	4 [1]	10/10	2/2
trans- Heptachlor epoxide	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2003	nd	nd	48	nd	13 [4.4]	5/30	1/6
	2004	tr(4.0)	nd	55	nd	12 [4]	9/31	2/7
	2005	nd	nd	37	nd	23 [7.5]	5/31	1/7
	2006	nd	nd	45	nd	13 [5]	5/31	1/7
	2007	nd	nd	61	nd	13 [5]	5/31	1/7
Fish (pg/g-wet)	2003	nd	nd	nd	nd	13 [4.4]	0/70	0/14
	2004	nd	nd	tr(10)	nd	12 [4]	2/70	2/14
	2005	nd	nd	nd	nd	23 [7.5]	0/80	0/16
	2006	nd	nd	nd	nd	13 [5]	0/80	0/16
	2007	nd	nd	nd	nd	13 [5]	0/80	0/16
Birds (pg/g-wet)	2003	nd	nd	nd	nd	13 [4.4]	0/10	0/2
	2004	nd	nd	nd	nd	12 [4]	0/10	0/2
	2005	nd	nd	nd	nd	23 [7.5]	0/10	0/2
	2006	nd	nd	nd	nd	13 [5]	0/10	0/2
	2007	nd	nd	nd	nd	13 [5]	0/10	0/2

Heptachlor: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 1.1～320 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 0.42～74 pg/m^3.

cis-Heptachlor epoxide: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid sites adopting the detection limit of 0.01 pg/m^3, and the detection range was 0.54～13 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid sites adopting the detection limit of 0.01 pg/m^3, and the detection range was 0.41～3.0 pg/m^3, and it was concluded that the concentration trend of decrease from 2002 to 2007 was statistically significant.

trans-Heptachlor epoxide: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at 8 of the 36 valid sites adopting the detection limit of 0.06 pg/m^3, and none of the detected concentrations exceeded 0.16 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at 1 of the 36 valid sites adopting the detection limit of 0.06 pg/m^3, and none of the detected concentrations exceeded tr(0.06) pg/m^3.

Stocktaking of the detection of heptachlor, *cis*-heptachlor epoxide, and *trans*-heptachlor epoxide in air during FY 2002～2007

Heptachlor	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	11	14	220	0.20	0.12 [0.04]	102/102	34/34
	2003Warm season	27	41	240	1.1	0.25 [0.085]	35/35	35/35
	2003Cold season	10	16	65	0.39		34/34	34/34
	2004Warm season	23	36	200	0.46	0.23 [0.078]	37/37	37/37
	2004Cold season	11	18	100	0.53		37/37	37/37
	2005Warm season	25	29	190	1.1	0.16 [0.054]	37/37	37/37
	2005Cold season	6.5	7.9	61	0.52		37/37	37/37
	2006Warm season	20	27	160	0.88	0.11 [0.04]	37/37	37/37
	2006Cold season	6.8	7.2	56	0.32		37/37	37/37
	2007Warm season	22	27	320	1.1	0.07[0.03]	36/36	36/36
	2007Cold season	6.3	8.0	74	0.42		36/36	36/36

cis- Heptachlor epoxide	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2003Warm season	3.5	3.5	28	0.45	0.015 [0.0048]	35/35	35/35
	2003Cold season	1.3	1.3	6.6	0.49		34/34	34/34
	2004Warm season	2.8	2.9	9.7	0.65	0.052 [0.017]	37/37	37/37
	2004Cold season	1.1	1.1	7.0	0.44		37/37	37/37
	2005Warm season	1.5	1.7	11	tr(0.10)	0.12 [0.044]	37/37	37/37
	2005Cold season	0.91	0.81	2.9	0.43		37/37	37/37
	2006Warm season	1.7	2.0	6.7	0.13	0.11 [0.04]	37/37	37/37
	2006Cold season	0.74	0.88	3.2	nd		36/37	36/37
	2007Warm season	2.9	2.8	13	0.54	0.03[0.01]	36/36	36/36
	2007Cold season	0.93	0.82	3.0	0.41		36/36	36/36

trans- Heptachlor epoxide	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2003Warm season	tr(0.036)	tr(0.038)	0.30	nd	0.099 [0.033]	18/35	18/35
	2003Cold season	nd	nd	tr(0.094)	nd		3/34	3/34
	2004Warm season	nd	nd	tr(0.38)	nd	0.6 [0.2]	4/37	4/37
	2004Cold season	nd	nd	nd	nd		0/37	0/37
	2005Warm season	tr(0.10)	tr(0.12)	1.2	nd	0.16 [0.05]	27/37	27/37
	2005Cold season	nd	nd	0.32	nd		3/37	3/37
	2006Warm season	nd	nd	0.7	nd	0.3 [0.1]	2/37	2/37
	2006Cold season	nd	nd	tr(0.1)	nd		1/37	1/37
	2007Warm season	nd	nd	0.16	nd	0.14[0.06]	8/36	8/36
	2007Cold season	nd	nd	tr(0.06)	nd		1/36	1/36

[9] Toxaphenes

- History and state of monitoring

Toxaphenes are a group of organochlorine insecticides. No domestic record of manufacture/import of the substances were reported since it was historically never registrated under the Agricultural Chemicals Regulation Law. The substances were designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in September 2002. In previous monitoring series before FY 2001, the substance were measured in FY 1983 (in surface water and sediment) under the framework of "the Environmental Survey and Monitoring of Chemicals."

- Monitoring results

○ Parlar-26, Parlar-50, and Parlar-62

Parlar-26: The presence of the substance in surface water was monitored at 48 sites, and it was not detected at all 48 valid sites adopting the detection limit of 5 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was not detected at all 64 valid sites adopting the detection limit of 3 pg/g-dry.

Parlar-50: The presence of the substance in surface water was monitored at 48 sites, and it was not detected at all 48 valid sites adopting the detection limit of 3 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was not detected at all 64 valid sites adopting the detection limit of 10 pg/g-dry.

Parlar-62: The presence of the substance in surface water was monitored at 48 sites, and it was not detected at all 48 valid sites adopting the detection limit of 30 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was not detected at all 64 valid sites adopting the detection limit of 70 pg/g-dry.

Stocktaking of the detection of parlar-26, parlar-50 and parlar-62 in surface water and sediment during FY 2003～2007

Parlar-26	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2003	nd	nd	nd	nd	40 [20]	0/36	0/36
	2004	nd	nd	nd	nd	9 [3]	0/38	0/38
	2005	nd	nd	nd	nd	10 [4]	0/47	0/47
	2006	nd	nd	nd	nd	16 [5]	0/48	0/48
	2007	nd	nd	nd	nd	20[5]	0/48	0/48
Sediment (pg/g-dry)	2003	nd	nd	nd	nd	90 [30]	0/186	0/62
	2004	nd	nd	nd	nd	60 [20]	0/189	0/63
	2005	nd	nd	nd	nd	60 [30]	0/189	0/63
	2006	nd	nd	nd	nd	12 [4]	0/192	0/64
	2007	nd	nd	nd	nd	7[3]	0/192	0/64
Parlar-50	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2003	nd	nd	nd	nd	70 [30]	0/36	0/36
	2004	nd	nd	nd	nd	20 [7]	0/38	0/38
	2005	nd	nd	nd	nd	20 [5]	0/47	0/47
	2006	nd	nd	nd	nd	16 [5]	0/48	0/48
	2007	nd	nd	nd	nd	9[3]	0/48	0/48
Sediment (pg/g-dry)	2003	nd	nd	nd	nd	200 [50]	0/186	0/62
	2004	nd	nd	nd	nd	60 [20]	0/189	0/63
	2005	nd	nd	nd	nd	90 [40]	0/189	0/63
	2006	nd	nd	nd	nd	24 [7]	0/192	0/64
	2007	nd	nd	nd	nd	30[10]	0/192	0/64
Parlar-62	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2003	nd	nd	nd	nd	300 [90]	0/36	0/36
	2004	nd	nd	nd	nd	90 [30]	0/38	0/38
	2005	nd	nd	nd	nd	70[30]	0/47	0/47
	2006	nd	nd	nd	nd	60 [20]	0/48	0/48
	2007	nd	nd	nd	nd	70[30]	0/48	0/48
Sediment (pg/g-dry)	2003	nd	nd	nd	nd	4,000 [2,000]	0/186	0/62
	2004	nd	nd	nd	nd	2,000 [400]	0/189	0/63
	2005	nd	nd	nd	nd	2,000 [700]	0/189	0/63
	2006	nd	nd	nd	nd	210 [60]	0/192	0/64
	2007	nd	nd	nd	nd	300[70]	0/192	0/64

Parlar-26: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 6 of the 7 valid areas adopting the detection limit of 4 pg/g-wet, and none of the detected concentrations exceeded 20 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in 14 of the 16 valid areas adopting the detection limit of 4 pg/g-wet, and none of the detected concentrations exceeded 690 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in 1 of the 2 valid areas adopting the detection limit of 4 pg/g-wet, and none of the detected concentrations exceeded 650 pg/g-wet.

Parlar-50: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 3 pg/g-wet, and none of the detected concentrations exceeded 37 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 3 pg/g-wet, and none of the detected concentrations exceeded 1,100 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in 1 of the 2 valid areas adopting the detection limit of 3 pg/g-wet, and none of the detected concentrations exceeded 930 pg/g-wet.

Parlar-62: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in none of 7 valid areas adopting the detection limit of 30 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in 7 of the 16 valid areas adopting the detection limit of 30 pg/g-wet, and none of the detected concentrations exceeded 530 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in 1 of the 2 valid areas adopting the detection limit of 30 pg/g-wet, and none of the detected concentrations exceeded 300 pg/g-wet.

Stocktaking of detection of parlar-26, parlar-50 and parlar-62 in wildlife (bivalves, fish and birds) in FY 2003～2007

Parlar-26	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2003	nd	nd	tr(39)	nd	45 [15]	11/30	3/6
	2004	nd	nd	tr(32)	nd	42 [14]	15/31	3/7
	2005	nd	nd	tr(28)	nd	47 [16]	7/31	4/7
	2006	tr(9)	tr(12)	25	nd	18 [7]	21/31	5/7
	2007	tr(8)	tr(8)	20	nd	10[4]	26/31	6/7
Fish (pg/g-wet)	2003	tr(29)	tr(24)	810	nd	45 [15]	44/70	11/14
	2004	tr(40)	tr(41)	1,000	nd	42 [14]	54/70	13/14
	2005	tr(39)	53	900	nd	47 [16]	50/75	13/16
	2006	37	44	880	nd	18 [7]	70/80	15/16
	2007	24	32	690	nd	10[4]	64/80	14/16
Birds (pg/g-wet)	2003	110	650	2,500	nd	45 [15]	5/10	1/2
	2004	71	340	810	nd	42 [14]	5/10	1/2
	2005	85	380	1,200	nd	47 [16]	5/10	1/2
	2006	48	290	750	nd	18 [7]	5/10	1/2
	2007	34	280	650	nd	10[4]	5/10	1/2
Parlar-50	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2003	tr(13)	tr(12)	58	nd	33 [11]	17/30	4/6
	2004	tr(16)	nd	tr(45)	nd	46 [15]	15/31	3/7
	2005	nd	nd	tr(38)	nd	54 [18]	9/31	4/7
	2006	tr(11)	14	32	nd	14 [5]	24/31	6/7
	2007	10	10	37	nd	9 [3]	27/31	7/7
Fish (pg/g-wet)	2003	34	34	1,100	nd	33 [11]	55/70	14/14
	2004	54	61	1,300	nd	46 [15]	59/70	14/14
	2005	tr(50)	66	1,400	nd	54 [18]	55/80	13/16
	2006	49	52	1,300	nd	14 [5]	79/80	16/16
	2007	32	41	1,100	nd	9 [3]	77/80	16/16
Birds (pg/g-wet)	2003	110	850	3,000	nd	33 [11]	5/10	1/2
	2004	83	440	1,000	nd	46 [15]	5/10	1/2
	2005	100	480	1,500	nd	54 [18]	5/10	1/2
	2006	46	380	1,000	nd	14 [5]	5/10	1/2
	2007	34	360	930	nd	9 [3]	5/10	1/2
Parlar-62	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2003	nd	nd	nd	nd	120 [40]	0/30	0/6
	2004	nd	nd	nd	nd	98 [33]	0/31	0/7
	2005	nd	nd	nd	nd	100 [34]	0/31	0/7
	2006	nd	nd	nd	nd	70 [30]	0/31	0/7
	2007	nd	nd	nd	nd	70 [30]	0/31	0/7
Fish (pg/g-wet)	2003	nd	nd	580	nd	120 [40]	9/70	3/14
	2004	nd	nd	870	nd	98 [33]	24/70	7/14
	2005	nd	nd	830	nd	100 [34]	23/80	8/16
	2006	tr(30)	nd	870	nd	70 [30]	28/80	10/16
	2007	nd	nd	530	nd	70 [30]	22/80	7/16
Birds (pg/g-wet)	2003	tr(96)	200	530	nd	120 [40]	5/10	1/2
	2004	tr(64)	110	280	nd	98 [33]	5/10	1/2
	2005	tr(77)	130	460	nd	100 [34]	5/10	1/2
	2006	70	120	430	nd	70 [30]	5/10	1/2
	2007	tr(60)	100	300	nd	70 [30]	5/10	1/2

Parlar-26: The presence of the substance in air in the warm season was monitored at 36 sites, and detected in 18 of the 36 valid sites adopting the detection limit of 0.2 pg/m^3, and none of the detected concentrations exceeded tr(0.3) pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected in none of 36 valid sites adopting the detection limit of 0.2 pg/m^3.

Parlar-50: The presence of the substance in air in the warm season was monitored at 36 sites, and detected in 29 of the 36 valid sites adopting the detection limit of 0.1 pg/m^3, and none of the detected concentrations exceeded tr(0.2) pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected in none of 36 valid sites adopting the detection limit of 0.1 pg/m^3.

Parlar-62: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected in none of 36 valid sites adopting the detection limit of 0.6 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected in none of 36 valid sites adopting the detection limit of 0.6 pg/m^3.

Stocktaking of the detection of parlar-26, parlar-50 and parlar-62 in air during FY 2003～2007

Parlar-26	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2003Warm season	0.31	0.31	0.77	tr(0.17)	0.20 [0.066]	35/35	35/35
	2003Cold season	tr(0.17)	tr(0.17)	0.27	tr(0.091)		34/34	34/34
	2004Warm season	0.27	0.26	0.46	tr(0.17)	0.20 [0.066]	37/37	37/37
	2004Cold season	tr(0.15)	tr(0.15)	0.50	tr(0.094)		37/37	37/37
	2005Warm season	nd	nd	nd	nd	0.3 [0.1]	0/37	0/37
	2005Cold season	nd	nd	nd	nd		0/37	0/37
	2006Warm season	nd	nd	nd	nd	1.8 [0.6]	0/37	0/37
	2006Cold season	nd	nd	nd	nd		0/37	0/37
	2007Warm season	nd	nd	tr(0.3)	nd	0.6[0.2]	18/36	18/36
	2007Cold season	nd	nd	nd	nd		0/36	0/36

Parlar-50	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2003Warm season	nd	nd	tr(0.37)	nd	0.81 [0.27]	2/35	2/35
	2003Cold season	nd	nd	nd	nd		0/34	0/34
	2004Warm season	nd	nd	nd	nd	1.2 [0.4]	0/37	0/37
	2004Cold season	nd	nd	nd	nd		0/37	0/37
	2005Warm season	nd	nd	nd	nd	0.6 [0.2]	0/37	0/37
	2005Cold season	nd	nd	nd	nd		0/37	0/37
	2006Warm season	nd	nd	nd	nd	1.6 [0.5]	0/37	0/37
	2006Cold season	nd	nd	nd	nd		0/37	0/37
	2007Warm season	nd	tr(0.1)	tr(0.2)	nd	0.3[0.1]	29/36	29/36
	2007Cold season	nd	nd	nd	nd		0/36	0/36

Parlar-62	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2003Warm season	nd	nd	nd	nd	1.6 [0.52]	0/35	0/35
	2003Cold season	nd	nd	nd	nd		0/34	0/34
	2004Warm season	nd	nd	nd	nd	2.4 [0.81]	0/37	0/37
	2004Cold season	nd	nd	nd	nd		0/37	0/37
	2005Warm season	nd	nd	nd	nd	1.2 [0.4]	0/37	0/37
	2005Cold season	nd	nd	nd	nd		0/37	0/37
	2006Warm season	nd	nd	nd	nd	8 [3]	0/37	0/37
	2006Cold season	nd	nd	nd	nd		0/37	0/37
	2007Warm season	nd	nd	nd	nd	1.5[0.6]	0/36	0/36
	2007Cold season	nd	nd	nd	nd		0/36	0/36

[10] Mirex

- History and state of monitoring

Mirex was developed as an organochlorine insecticide chemical in the United States and is also used as a flame retardant. No domestic record of manufacture/import of the substance was reported since it was historically never registrated under the Agricultural Chemicals Regulation Law. Designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in September 2002, manufacture and use of the substance were essentially banned. Before FY 2001, the substance was measured in FY 1983 (in surface water and sediment) under the framework of "the Environmental Survey and Monitoring of Chemicals."

- Monitoring results

The presence of the substance in surface water was monitored at 48 sites, and it was detected at 2 of the 48 valid sites adopting the detection limit of 0.4 pg/L, and none of the detected concentrations exceeded tr(0.5) pg/L.

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 55 of the 64 valid sites adopting the detection limit of 0.3 pg/g-dry, and none of the detected concentrations exceeded 200 pg/g-dry.

Stocktaking of the detection of mirex in surface water and sediment during FY 2003～2007

Mirex	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2003	tr(0.13)	tr(0.12)	0.8	nd	0.3 [0.09]	25/36	25/36
	2004	nd	nd	1.1	nd	0.4 [0.2]	18/38	18/38
	2005	nd	nd	1.0	nd	0.4 [0.1]	14/47	14/47
	2006	nd	nd	0.07	nd	1.6 [0.5]	1/48	1/48
	2007	nd	nd	tr(0.5)	nd	1.1[0.4]	2/48	2/48
Sediment (pg/g-dry)	2003	tr(1.8)	tr(1.6)	1,500	nd	2 [0.4]	137/186	51/62
	2004	2.1	tr(1.6)	220	nd	2 [0.5]	153/189	55/63
	2005	1.5	1.2	5,300	nd	0.9 [0.3]	134/189	48/63
	2006	1.5	1.2	640	nd	0.6 [0.2]	156/192	57/64
	2007	1.3	0.9	200	nd	0.9[0.3]	147/192	55/64

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was tr(2)～18 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was tr(1)～36 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 32～100 pg/g-wet.

Stocktaking of the detection of mirex in wildlife (bivalves, fish and birds) during FY 2003～2007

Mirex	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2003	4.8	4.2	19	tr(1.6)	2.4 [0.81]	30/30	6/6
	2004	4.5	4.3	12	tr(1.1)	2.5 [0.82]	31/31	7/7
	2005	5.7	5.2	20	tr(1.9)	3.0 [0.99]	31/31	7/7
	2006	5	4	19	tr(2)	3 [1]	31/31	7/7
	2007	5	4	18	tr(2)	3 [1]	31/31	7/7
Fish (pg/g-wet)	2003	7.9	9.0	25	tr(1.7)	2.4 [0.81]	70/70	14/14
	2004	11	11	180	3.8	2.5 [0.82]	70/70	14/14
	2005	12	13	78	tr(1.0)	3.0 [0.99]	80/80	16/16
	2006	10	10	53	tr(2)	3 [1]	80/80	16/16
	2007	9	11	36	tr(1)	3 [1]	80/80	16/16
Birds (pg/g-wet)	2003	110	150	450	31	2.4 [0.81]	10/10	2/2
	2004	61	64	110	33	2.5 [0.82]	10/10	2/2
	2005	76	66	180	41	3.0 [0.99]	10/10	2/2
	2006	72	70	280	39	3 [1]	10/10	2/2
	2007	56	59	100	32	3 [1]	10/10	2/2

The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.01 pg/m^3, and the detection range was 0.04～0.28 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.01 pg/m^3, and the detection range was tr(0.02)～0.09 pg/m^3.

Stocktaking of the detection of mirex in air during FY 2003～2007

Mirex	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2003Warm season	0.11	0.12	0.19	0.047	0.0084 [0.0028]	35/35	35/35
	2003Cold season	0.044	0.043	0.099	0.024		34/34	34/34
	2004Warm season	0.099	0.11	0.16	tr(0.042)	0.05 [0.017]	37/37	37/37
	2004Cold season	tr(0.046)	tr(0.047)	0.23	tr(0.019)		37/37	37/37
	2005Warm season	tr(0.09)	tr(0.09)	0.24	tr(0.05)	0.10 [0.03]	37/37	37/37
	2005Cold season	tr(0.04)	tr(0.04)	tr(0.08)	nd		29/37	29/37
	2006Warm season	tr(0.07)	tr(0.10)	0.22	nd	0.13 [0.04]	29/37	29/37
	2006Cold season	tr(0.07)	tr(0.07)	2.1	nd		27/37	27/37
	2007Warm season	0.11	0.11	0.28	0.04	0.03[0.01]	36/36	36/36
	2007Cold season	0.04	0.04	0.09	tr(0.02)		36/36	36/36

[11] HCHs

- History and state of monitoring

HCHs were used as plant protection products, pesticides, household insecticides, and termitecides, etc. Even after their registration under the Agricultural Chemicals Regulation Law was expired in FY 1971, they continue to be used as termitecides and wood preservatives. Among many HCH isomers, α-HCH, β-HCH, γ-HCH and δ-HCH have been monitored in surface water, sediment, wildlife (bivalves, fish and birds) and air.

Before FY 2001, the substances were measured in FY 1974 (in surface water, sediment and fish) under the framework of "the Environmental Survey and Monitoring of Chemicals." α-HCH and β-HCH had been the target chemicals, and surface water and sediment had been the monitored media during the period of FY 1986～1998 and FY 1986～2001, respectively. Under the framework of the Wildlife Monitoring, the substances were monitored in wildlife (bivalves, fish and birds) during the period of FY 1978～1996 and in FY 1998, FY 2000 and FY 2001 (γ-HCH and δ-HCH had not been monitored since FY 1997 and FY 1993, respectively.)

- Monitoring results

○ α-HCH, β-HCH, γ-HCH and δ-HCH

α-HCH: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.6 pg/L, and the detection range was 13～720 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of 0.6 pg/g-dry, and the detection range was tr(1.3)～12,000 pg/g-dry.

β-HCH: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.9 pg/L, and the detection range was 18～1,300 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of 0.3 pg/g-dry, and the detection range was 1.6～59,000 pg/g-dry.

γ-HCH: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.7 pg/L, and the detection range was 5.2～290 pg/L, and it was concluded that the concentration trend of decrease from 2003 to 2007 was statistically significant. The presence of the substance in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of 0.4 pg/g-dry, and the detection range was tr(0.6)～5,200 pg/g-dry.

δ-HCH: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.4 pg/L, and the detection range was tr(0.7)～720 pg/L. The presence of the substance in sediment was monitored at 64 sites, and it was detected at 60 of the 64 valid sites adopting the detection limit of 2 pg/g-dry, and none of the detected concentrations exceeded 5,400 pg/g-dry, and it was concluded that the concentration trend of decrease from 2003 to 2007 was statistically significant.

Stocktaking of the detection of α-HCH, β-HCH、γ-HCH and δ-HCH in surface water and sediment during FY 2002～2007

α-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	84	76	6,500	1.9	0.9 [0.3]	114/114	38/38
	2003	120	120	970	13	3 [0.9]	36/36	36/36
	2004	150	145	5,700	13	6 [2]	38/38	38/38
	2005	90	81	660	16	4 [1]	47/47	47/47
	2006	110	90	2,100	25	3 [1]	48/48	48/48
	2007	76	73	720	13	1.9[0.6]	48/48	48/48
Sediment (pg/g-dry)	2002	130	170	8,200	2.0	1.2 [0.4]	189/189	63/63
	2003	140	170	9,500	2	2 [0.5]	186/186	62/62
	2004	140	180	5,700	tr(1.5)	2 [0.6]	189/189	63/63
	2005	120	160	7,000	3.4	1.7 [0.6]	189/189	63/63
	2006	130	160	4,300	tr(2)	5 [2]	192/192	64/64
	2007	120	150	12,000	tr(1.3)	1.8[0.6]	192/192	64/64
β-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	210	180	1,600	24	0.9 [0.3]	114/114	38/38
	2003	250	240	1,700	14	3 [0.7]	36/36	36/36
	2004	260	250	3,400	31	4 [2]	38/38	38/38
	2005	200	170	2,300	25	2.6 [0.9]	47/47	47/47
	2006	200	160	2,000	42	1.7 [0.6]	48/48	48/48
	2007	170	150	1,300	18	2.7[0.9]	48/48	48/48
Sediment (pg/g-dry)	2002	200	230	11,000	3.9	0.9 [0.3]	189/189	63/63
	2003	220	220	39,000	5	2 [0.7]	186/186	62/62
	2004	220	230	53,000	4	3 [0.8]	189/189	63/63
	2005	180	220	13,000	3.9	2.6 [0.9]	189/189	63/63
	2006	180	210	21,000	2.3	1.3 [0.4]	192/192	64/64
	2007	170	190	59,000	1.6	0.9[0.3]	192/192	64/64
γ-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2003	92	90	370	32	7 [2]	36/36	36/36
	2004	91	76	8,200	21	20 [7]	38/38	38/38
	2005	48	40	250	tr(8)	14 [5]	47/47	47/47
	2006	44	43	460	tr(9)	18 [6]	48/48	48/48
	2007	34	32	290	5.2	2.1[0.7]	48/48	48/48
Sediment (pg/g-dry)	2003	45	47	4,000	tr(1.4)	2 [0.4]	186/186	62/62
	2004	46	48	4,100	tr(0.8)	2 [0.5]	189/189	63/63
	2005	44	46	6,400	tr(1.8)	2.0 [0.7]	189/189	63/63
	2006	45	49	3,500	tr(1.4)	2.1 [0.7]	192/192	64/64
	2007	35	41	5,200	tr(0.6)	1.2[0.4]	192/192	64/64
δ-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2003	14	14	200	tr(1.1)	2 [0.5]	36/36	36/36
	2004	24	29	670	tr(1.4)	2 [0.7]	38/38	38/38
	2005	1.8	nd	62	nd	1.5 [0.5]	23/47	23/47
	2006	24	18	1,000	2.2	2.0 [0.8]	48/48	48/48
	2007	11	9.7	720	tr(0.7)	1.2[0.4]	48/48	48/48
Sediment (pg/g-dry)	2003	37	46	5,400	nd	2 [0.7]	180/186	61/62
	2004	48	55	5,500	tr(0.5)	2 [0.5]	189/189	63/63
	2005	46	63	6,200	nd	1.0 [0.3]	188/189	63/63
	2006	41	47	6,000	nd	1.7 [0.6]	189/192	64/64
	2007	22	28	5,400	nd	5[2]	165/192	60/64

α-HCH: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 8～1,400 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was tr(2)～730 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 43～210 pg/g-wet.

β-HCH: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 21～1,800 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 7～

810 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 1,400～3,200 pg/g-wet.

γ-HCH: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was tr(4)～450 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in 15 of the 16 valid areas adopting the detection limit of 3 pg/g-wet, and none of the detected concentrations exceeded 190 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was tr(8)～140 pg/g-wet.

δ-HCH: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 4 of the 7 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded 750 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in 10 of the 16 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded 31 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 4～22 pg/g-wet.

Stocktaking of the detection of *α*-HCH, *β*-HCH, *γ*-HCH and *δ*-HCH in wildlife (bivalves, fish and birds) during FY 2002～2007

α-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	65	64	1,100	12	4.2 [1.4]	38/38	8/8
	2003	45	30	610	9.9	1.8 [0.61]	30/30	6/6
	2004	35	25	1,800	tr(12)	13 [4.3]	31/31	7/7
	2005	24	25	1,100	tr(7.1)	11 [3.6]	31/31	7/7
	2006	21	21	390	6	3 [1]	31/31	7/7
	2007	19	17	1,400	8	7 [2]	31/31	7/7
Fish (pg/g-wet)	2002	51	56	590	tr(1.9)	4.2 [1.4]	70/70	14/14
	2003	41	58	590	2.6	1.8 [0.61]	70/70	14/14
	2004	57	55	2,900	nd	13 [4.3]	63/70	14/14
	2005	41	43	1,000	nd	11 [3.6]	75/80	16/16
	2006	42	53	360	tr(2)	3 [1]	80/80	16/16
	2007	37	40	730	tr(2)	7 [2]	80/80	16/16
Birds (pg/g-wet)	2002	160	130	360	93	4.2 [1.4]	10/10	2/2
	2003	70	74	230	30	1.8 [0.61]	10/10	2/2
	2004	120	80	1,600	58	13 [4.3]	10/10	2/2
	2005	76	77	85	67	11 [3.6]	10/10	2/2
	2006	75	75	100	55	3 [1]	10/10	2/2
	2007	68	59	210	43	7 [2]	10/10	2/2

β-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2002	89	62	1,700	32	12 [4]	38/38	8/8
	2003	77	50	1,100	23	9.9 [3.3]	30/30	6/6
	2004	69	74	1,800	22	6.1 [2.0]	31/31	7/7
	2005	56	56	2,000	20	2.2 [0.75]	31/31	7/7
	2006	59	70	880	11	3 [1]	31/31	7/7
	2007	53	56	1,800	21	7 [3]	31/31	7/7
Fish (pg/g-wet)	2002	99	120	1,800	tr(5)	12 [4]	70/70	14/14
	2003	78	96	1,100	tr(3.5)	9.9 [3.3]	70/70	14/14
	2004	100	140	1,100	tr(3.9)	6.1 [2.0]	70/70	14/14
	2005	88	110	1,300	6.7	2.2 [0.75]	80/80	16/16
	2006	85	110	1,100	4	3 [1]	80/80	16/16
	2007	100	120	810	7	7 [3]	80/80	16/16
Birds (pg/g-wet)	2002	3,000	3,000	7,300	1,600	12 [4]	10/10	2/2
	2003	3,400	3,900	5,900	1,800	9.9 [3.3]	10/10	2/2
	2004	2,200	2,100	4,800	1,100	6.1 [2.0]	10/10	2/2
	2005	2,500	2,800	6,000	930	2.2 [0.75]	10/10	2/2
	2006	2,100	2,400	4,200	1,100	3 [1]	10/10	2/2
	2007	2,000	1,900	3,200	1,400	7 [3]	10/10	2/2
γ-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2003	19	18	130	5.2	3.3 [1.1]	30/30	6/6
	2004	tr(19)	tr(16)	230	nd	31 [10]	28/31	7/7
	2005	15	13	370	tr(5.7)	8.4 [2.8]	31/31	7/7
	2006	14	12	140	7	4 [2]	31/31	7/7
	2007	11	10	450	tr(4)	9 [3]	31/31	7/7
Fish (pg/g-wet)	2003	16	22	130	tr(1.7)	3.3 [1.1]	70/70	14/14
	2004	tr(27)	tr(24)	660	nd	31 [10]	55/70	11/14
	2005	17	17	230	nd	8.4 [2.8]	78/80	16/16
	2006	18	22	97	tr(2)	4 [2]	80/80	16/16
	2007	15	15	190	nd	9 [3]	71/80	15/16
Birds (pg/g-wet)	2003	14	19	40	3.7	3.3 [1.1]	10/10	2/2
	2004	34	tr(21)	1,200	tr(11)	31 [10]	10/10	2/2
	2005	18	20	32	9.6	8.4 [2.8]	10/10	2/2
	2006	16	17	29	8	4 [2]	10/10	2/2
	2007	18	14	140	tr(8)	9 [3]	10/10	2/2
δ-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (pg/g-wet)	2003	7.2	tr(2.6)	1,300	nd	3.9 [1.3]	29/30	6/6
	2004	tr(3.0)	tr(2.1)	1,500	nd	4.6 [1.5]	25/31	6/7
	2005	tr(2.5)	tr(2.1)	1,600	nd	5.1 [1.7]	23/31	6/7
	2006	3	tr(2)	890	tr(1)	3 [1]	31/31	7/7
	2007	nd	nd	750	nd	4 [2]	12/31	4/7
Fish (pg/g-wet)	2003	tr(3.5)	4.0	16	nd	3.9 [1.3]	59/70	13/14
	2004	tr(4.1)	tr(3.5)	270	nd	4.6 [1.5]	54/70	11/14
	2005	tr(3.2)	tr(3.1)	32	nd	5.1 [1.7]	55/80	12/16
	2006	4	3	35	nd	3 [1]	72/80	16/16
	2007	tr(3)	tr(2)	31	nd	4 [2]	42/80	10/16
Birds (pg/g-wet)	2003	18	18	31	12	3.9 [1.3]	10/10	2/2
	2004	16	14	260	6.4	4.6 [1.5]	10/10	2/2
	2005	16	15	30	10	5.1 [1.7]	10/10	2/2
	2006	13	12	21	9	3 [1]	10/10	2/2
	2007	10	10	22	4	4 [2]	10/10	2/2

α-HCH: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.04 pg/m^3, and the detection range was 28～2,200 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.04 pg/m^3, and the detection range was 9.7～730 pg/m^3.

β-HCH: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.02 pg/m^3, and the detection range was 1.1～67 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.02 pg/m^3, and the detection range was 0.52～17 pg/m^3.

γ-HCH: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.04 pg/m^3, and the detection range was 7.7～750 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.04 pg/m^3, and the detection range was 2.3～160 pg/m^3.

δ-HCH: The presence of the substance in air in the warm season was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.02 pg/m^3, and the detection range was 0.27～37 pg/m^3. For air in the cold season, the substance was monitored at 36 sites, and it was detected at all 36 valid areas adopting the detection limit of 0.02 pg/m^3, and the detection range was 0.12～24 pg/m^3.

Stocktaking of the detection of α-HCH, β-HCH、γ-HCH and δ-HCH in air during FY 2003～2007

α-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Air (pg/m^3)	2003Warm season	210	120	5,000	38	0.71 [0.24]	35/35	35/35
	2003Cold season	49	35	1,400	9.9		34/34	34/34
	2004Warm season	160	130	3,200	24	0.33 [0.11]	37/37	37/37
	2004Cold season	68	52	680	11		37/37	37/37
	2005Warm season	110	78	2,000	22	0.074 [0.024]	37/37	37/37
	2005Cold season	35	22	630	9.6		37/37	37/37
	2006Warm season	98	74	1,400	21	0.08 [0.03]	37/37	37/37
	2006Cold season	41	26	630	7.6		37/37	37/37
	2007Warm season	190	150	2,200	28	0.09[0.04]	36/36	36/36
	2007Cold season	46	33	730	9.7		36/36	36/36
β-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Air (pg/m^3)	2003Warm season	9.6	11	97	1.1	0.19 [0.063]	35/35	35/35
	2003Cold season	2.1	1.6	57	0.52		34/34	34/34
	2004Warm season	6.6	7.7	110	0.53	0.12 [0.041]	37/37	37/37
	2004Cold season	2.6	2.6	78	0.32		37/37	37/37
	2005Warm season	4.9	5.7	52	0.67	0.12 [0.044]	37/37	37/37
	2005Cold season	1.1	1.1	16	0.24		37/37	37/37
	2006Warm season	4.5	4.9	26	0.66	0.17 [0.06]	37/37	37/37
	2006Cold season	0.98	0.99	17	tr(0.12)		37/37	37/37
	2007Warm season	9.1	12	67	1.1	0.06[0.02]	36/36	36/36
	2007Cold season	1.9	2.1	17	0.52		36/36	36/36
γ-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Air (pg/m^3)	2003Warm season	63	44	2,200	8.8	0.57 [0.19]	35/35	35/35
	2003Cold season	14	12	330	3.1		34/34	34/34
	2004Warm season	46	43	860	4.5	0.23 [0.076]	37/37	37/37
	2004Cold season	19	16	230	2.6		37/37	37/37
	2005Warm season	34	24	650	5.9	0.13 [0.044]	37/37	37/37
	2005Cold season	9.3	6.6	110	2.1		37/37	37/37
	2006Warm season	28	23	540	4.4	0.08 [0.03]	37/37	37/37
	2006Cold season	12	11	270	2.5		37/37	37/37
	2007Warm season	58	46	750	7.7	0.11[0.04]	36/36	36/36
	2007Cold season	13	11	160	2.3		36/36	36/36
δ-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Air (pg/m^3)	2003Warm season	5.1	4.2	120	0.48	0.03 [0.01]	35/35	35/35
	2003Cold season	0.97	0.76	47	0.11		34/34	34/34
	2004Warm season	2.2	2.5	93	0.15	0.15 [0.05]	37/37	37/37
	2004Cold season	0.76	0.77	18	tr(0.07)		37/37	37/37
	2005Warm season	1.7	1.7	35	0.29	0.13 [0.04]	37/37	37/37
	2005Cold season	0.38	0.41	11	nd		36/37	36/37
	2006Warm season	2.0	2.0	17	tr(0.12)	0.14 [0.05]	37/37	37/37
	2006Cold season	0.80	0.62	14	tr(0.13)		37/37	37/37
	2007Warm season	2.8	3.2	37	0.27	0.05[0.02]	36/36	36/36
	2007Cold season	0.63	0.55	24	0.12		36/36	36/36

(2) The Environmental Monitoring (excluding POPs and HCHs)

Except for undetected cases of pentachlorobenzene, hexachlorobuta-1,3-diene and hexabromobenzene in surface water, tetrabromobisphenol A, hexachlorobuta-1,3-diene and hexabromobenzene in wildlife, all chemicals were detected.

The monitoring results for each chemical (group) are described below.

[12] Acrylamide

- History and state of monitoring

Acrylamid is used as materials for paper strengthening agent, flocculant, etc. Under the framework of "the Environmental Survey and Monitoring of Chemicals", the substance was detected in surface water and in sediment in FY 1991, but detected neither in surface water in FY 1975, in wildlife (fish) in FY 1991, nor in surface water and in sediment in FY 1998 .

- Monitoring results

The presence of the substance in surface water was monitored at 48 sites, and it was detected at 13 of the 48 valid sites adopting the detection limit of 2.3 ng/L, and none of the detected concentrations exceeded 49 ng/L.

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 40 of the 64 valid sites adopting the detection limit of 0.079 ng/g-dry, and none of the detected concentrations exceeded 1.9 ng/g-dry.

Stocktaking of detection of acrylamid in surface water and sediment in FY 2007

Acrylamid	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2007	tr(2.3)	nd	49	nd	5.9[2.3]	13/48	13/48
Sediment (ng/g-dry)	2007	0.11	0.1	1.9	nd	0.2[0.079]	87/175	40/64

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 0.022 ng/g-wet, and the detection range was tr(0.05)～1.4 ng/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 0.022 ng/g-wet, and none of the detected concentrations exceeded 19 ng/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 0.022 ng/g-wet, and the detection range was 0.24～0.68 ng/g-wet.

Stocktaking of detection of acrylamid in wildlife (bivalves, fish and birds) in FY 2007

Acrylamid	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (ng/g-wet)	2007	0.34	0.42	1.4	tr(0.05)	0.067[0.022]	31/31	7/7
Fish (ng/g-wet)	2007	0.17	0.19	1.9	nd	0.067[0.022]	75/80	16/16
Birds (ng/g-wet)	2007	0.39	0.41	0.68	0.24	0.067[0.022]	10/10	2/2

[13] Trichlorobenzenes

- History and state of monitoring

Trichlorobenzenes are used as dyes, intermediates for pigments, trans oil (insulating oil), lubricant etc. Under the framework of "the Environmental Survey and Monitoring of Chemicals", the substances were detected in wildlife (fish) in FY 1975, in surface water, in sediment and in wildlife (fish) in FY 1979, and in air in FY 1999. Also, under the framework of "the Wildlife Monitoring", 1,2,3-trichlorobenzene was detected in bivalves (in FY 1990, FY 1992, FY 1994 and FY 1996) and in fish (in FY 1981, FY 1982 and FY 1992), 1,2,4-trichlorobenzene was detected in bivalves (in FY 1983, FY 1990, FY 1992, FY 1994 and FY 1996) and in fish (in FY 1980, FY 1981, FY 1982, FY 1983, FY 1984, FY 1985, FY 1986, FY 1990, FY 1992, FY 1996 and FY 1999), and 1,3,5-trichlorobenzene was detected in fish (in FY 1990 and FY 1994), respectively. The substances were monitored in air in conjunction with the monitoring of pentachlorobenzene, which is a candidate for inclusion in the Stockholm Convention.

- Monitoring results

○ Trichlorobenzenes (total amount), 1,2,3-Trichlorobenzene, 1,2,4-Trichlorobenzene and 1,3,5-Trichlorobenzene

Trichlorobenzenes (total amount): The presence of the substances in air in the warm season was monitored at 36 sites and, excluding 10 sites whose concentration were treated as invalid, it was detected at all 26 valid sites adopting the detection limit of 0.027 ng/m^3, and the detection range was 0.23～17 ng/m^3. For air in the cold season, the substances were monitored at 36 sites and, excluding 11 sites whose concentration were treated as invalid, it was detected at all 25 valid sites adopting the detection limit of 0.027 ng/m^3, and the detection range was 0.22～15 ng/m^3.

1,2,3-Trichlorobenzene: The presence of the substance in air in the warm season was monitored at 36 sites and, excluding 10 sites whose concentration were treated as invalid, it was detected at all 26 valid sites adopting the detection limit of 0.011 ng/m^3, and the detection range was tr(0.019)～1.7 ng/m^3. For air in the cold season, the substance was monitored at 36 sites and, excluding 11 sites whose concentration were treated as invalid, it was detected at all 25 valid sites adopting the detection limit of 0.011 ng/m^3, and the detection range was tr(0.026)～1.7 ng/m^3.

1,2,4-Trichlorobenzene: The presence of the substance in air in the warm season was monitored at 36 sites and, excluding 10 sites whose concentration were treated as invalid, it was detected at all 26 valid sites adopting the detection limit of 0.010 ng/m^3, and the detection range was 0.20～15 ng/m^3. For air in the cold season, the substance was monitored at 36 sites and, excluding 11 sites whose concentration were treated as invalid, it was detected at all 25 valid sites adopting the detection limit of 0.010 ng/m^3, and the detection range was 0.18～14 ng/m^3.

1,3,5-Trichlorobenzene: The presence of the substance in air in the warm season was monitored at 36 sites and, excluding 10 sites whose concentration were treated as invalid, it was detected at all 26 valid sites adopting the detection limit of 0.0063 ng/m^3, and the detection range was tr(0.011)～1.3 ng/m^3. For air in the cold season, the substance was monitored at 36 sites and, excluding 11 sites whose concentration were treated as invalid, it was detected at all 25 valid sites adopting the detection limit of 0.0063 ng/m^3, and the detection range was tr(0.010)～0.23 ng/m^3.

The cause of the above-mentioned invalidity at 10 sites in the warm season and at 11 sites in the cold season was the malfunction of measuring instruments.

Stocktaking of detection of trichlorobenzenes (total amount), 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene and 1,3,5-trichlorobenzene in air in FY 2007

Trichlorobenzenes (total amount)	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (ng/m^3)	2007Warm season	1.4	1.4	17	0.23	0.072[0.027]	78/78	26/26
	2007Cold season	1.1	0.88	15	0.22		75/75	25/25
1,2,3-Trichlorobenzene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (ng/m^3)	2007Warm season	0.22	0.24	1.7	tr(0.019)	0.029[0.011]	78/78	26/26
	2007Cold season	0.18	0.16	1.7	tr(0.026)		75/75	25/25
1,2,4-Trichlorobenzene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (ng/m^3)	2007Warm season	1.1	1.1	15	0.20	0.027[0.010]	78/78	26/26
	2007Cold season	0.85	0.65	14	0.18		75/75	25/25
1,3,5-Trichlorobenzene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (ng/m^3)	2007Warm season	0.060	0.057	1.3	tr(0.011)	0.016[0.0063]	78/78	26/26
	2007Cold season	0.053	0.051	0.23	tr(0.010)		75/75	25/25

[14] Tetrachlorobenzenes

- History and state of monitoring

Tetrachlorobenzenes are treated as a Existing Chemical Substance (low molecular Carbo-monocyclic Organic Compounds) under the Chemical Substances Control Law. Under the framework of "the Environmental Survey and Monitoring of Chemicals", the substances were detected in air in FY 1999. Also, under the framework of "the Wildlife Monitoring", 1,2,3,4-tetrachlorobenzene was detected in bivalves (in FY 1990, FY 1992, and FY 1994) and in fish (in FY 1981 and FY 1982), and 1,2,4,5- tetrachlorobenzene was detected in fish (in FY 1982), respectively. The substances were monitored in air in conjunction with the monitoring of pentachlorobenzene which is a candidate for inclusion in the Stockholm Convention.

- Monitoring results

○ Tetrachlorobenzenes (total amount), 1,2,3,4-Tetrachlorobenzene, 1,2,3,5-Tetrachlorobenzene and 1,2,4,5- Tetrachlorobenzene

Tetrachlorobenzenes (total amount): The presence of the substances in air in the warm season was monitored at 36 sites and, excluding 10 sites whose concentration were treated as invalid, it was detected at all 26 valid sites adopting the detection limit of 0.016 ng/m^3, and the detection range was 0.058～1.6 ng/m^3. For air in the cold season, the substances were monitored at 36 sites and, excluding 11 sites whose concentration were treated as invalid, it was detected at all 25 valid sites adopting the detection limit of 0.016 ng/m^3, and the detection range was 0.071～0.65 ng/m^3.

1,2,3,4-Tetrachlorobenzene: The presence of the substance in air in the warm season was monitored at 36 sites and, excluding 10 sites whose concentration were treated as invalid, it was detected at all 26 valid sites adopting the detection limit of 0.0041 ng/m^3, and the detection range was 0.031～0.95 ng/m^3. For air in the cold season, the substance was monitored at 36 sites and, excluding 11 sites whose concentration were treated as invalid, it was detected at all 25 valid sites adopting the detection limit of 0.0041 ng/m^3, and the detection range was 0.033～0.40 ng/m^3.

1,2,3,5-Tetrachlorobenzene: The presence of the substance in air in the warm season was monitored at 36 sites and, excluding 10 sites whose concentration were treated as invalid, it was detected at all 26 valid sites adopting the detection limit of 0.0058 ng/m^3, and the detection range was tr(0.007)～0.29 ng/m^3. For air in the cold season, the substance was monitored at 36 sites and, excluding 11 sites whose concentration were treated as invalid, it was detected at all 25 valid sites adopting the detection limit of 0.0058 ng/m^3, and the detection range was tr(0.013)～0.15 ng/m^3.

1,2,4,5- Tetrachlorobenzene: The presence of the substance in air in the warm season was monitored at 36 sites and, excluding 10 sites whose concentration were treated as invalid, it was detected at all 26 valid sites adopting the detection limit of 0.0056 ng/m^3, and the detection range was 0.020～0.39 ng/m^3. For air in the cold season, the substance was monitored at 36 sites and, excluding 11 sites whose concentration were treated as invalid, it was detected at all 25 valid sites adopting the detection limit of 0.0056 ng/m^3, and the detection range was 0.017～0.15 ng/m^3.

The cause of the above-mentioned invalidity at 10 sites in the warm season and at 11 sites in the cold season was the malfunction of measuring instruments.

Stocktaking of detection of tetrachlorobenzenes (total amount), 1,2,3,4-tetrachlorobenzene, 1,2,3,5-tetrachlorobenzene and 1,2,4,5- tetrachlorobenzene in air in FY 2007

Tetrachlorobenzenes (total amount)	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (ng/m^3)	2007Warm season	0.18	0.16	1.6	0.058	0.040[0.016]	78/78	26/26
	2007Cold season	0.16	0.15	0.65	0.071		75/75	25/25
1,2,3,4-Tetrachlorobenzene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (ng/m^3)	2007Warm season	0.085	0.075	0.95	0.031	0.011[0.0041]	78/78	26/26
	2007Cold season	0.076	0.071	0.40	0.033		75/75	25/25
1,2,3,5-Tetrachlorobenzene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (ng/m^3)	2007Warm season	0.040	0.037	0.29	tr(0.007)	0.015[0.0058]	78/78	26/26
	2007Cold season	0.037	0.034	0.15	tr(0.013)		75/75	25/25
1,2,4,5-Tetrachlorobenzene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (ng/m^3)	2007Warm season	0.052	0.047	0.39	0.020	0.014[0.0056]	78/78	26/26
	2007Cold season	0.042	0.041	0.15	0.017		75/75	25/25

[15] Pentachlorobenzene

- History and state of monitoring

Pentachlorobenzene had been used as a flame retardant and a pesticide, and was recommended for inclusion in the Stockholm convention at the 4th meeting of the Persistent Organic Pollutants Review Committee (POPRC4) in October 2008. Under the framework of "the Environmental Survey and Monitoring of Chemicals", the substance was detected in wildlife (fish) in FY 1975, in sediment and in wildlife (fish) in FY 1979, in air in FY 1994 and in air in FY 1999. Also, under the framework of "the Wildlife Monitoring", the substance was detected in fish (in FY 1980 and FY 1982) and in birds (in FY 1984, FY 1985 and FY 1988).

- Monitoring results

The presence of the substance in surface water was monitored at 48 sites, and it was detected in none of 48 valid sites adopting the detection limit of 1.3 ng/L.

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 35 of the 64 valid sites adopting the detection limit of 0.033 ng/g-dry, and none of the detected concentrations exceeded 24 ng/g-dry.

Stocktaking of detection of pentachlorobenzene in surface water and sediment in FY 2007

Pentachlorobenzene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2007	nd	nd	nd	nd	3.3[1.3]	0/48	0/48
Sediment (ng/g-dry)	2007	tr(0.043)	nd	24	nd	0.086[0.033]	79/192	35/64

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 1 of the 7 valid areas adopting the detection limit of 0.061 ng/g-wet, and none of the detected concentrations exceeded tr(0.15) ng/g-wet. For fish, the substance was monitored in 16 areas and detected in 10 of the 16 valid areas adopting the detection limit of 0.061 ng/g-wet, and none of the detected concentrations exceeded 0.48 ng/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 0.061 ng/g-wet, and the detection range was tr(0.089)～0.21 ng/g-wet.

Stocktaking of detection of pentachlorobenzene in wildlife (bivalves, fish and birds) in FY 2007

Pentachlorobenzene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (ng/g-wet)	2007	nd	nd	tr(0.15)	nd	0.18[0.061]	1/31	1/7
Fish (ng/g-wet)	2007	nd	nd	0.48	nd	0.18[0.061]	36/80	10/16
Birds (ng/g-wet)	2007	tr(0.14)	tr(0.14)	0.21	tr(0.089)	0.18[0.061]	10/10	2/2

The presence of the substance in air in the warm season was monitored at 36 sites and, excluding 10 sites whose concentration were treated as invalid, it was detected at all 26 valid sites adopting the detection limit of 0.0048 ng/m^3, and the detection range was 0.018～0.31 ng/m^3. For air in the cold season, the substance was monitored at 36 sites and, excluding 11 sites whose concentration were treated as invalid, it was detected at all 25 valid sites adopting the detection limit of 0.0048 ng/m^3, and the detection range was 0.027～0.22 ng/m^3.

The cause of the above-mentioned invalidity at 10 sites in the warm season and at 11 sites in the cold season was the malfunction of measuring instruments.

Stocktaking of detection of pentachlorobenzene in air in FY 2007

Pentachlorobenzene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (ng/m^3)	2007Warm season	0.085	0.083	0.31	0.018	0.012[0.0048]	78/78	26/26
	2007Cold season	0.060	0.055	0.22	0.027		75/75	25/25

[16] Tetrabromobisphenol A

- History and state of monitoring

Tetrabromobisphenol A is used as a flame retardant for plastic products. Under the framework of "the Environmental Survey and Monitoring of Chemicals", the substance was detected in surface water and in sediment in FY 1987, and in sediment in FY 1988.

Under the framework of the Environmental Monitoring, the substance was detected in wildlife (bivalves and birds) in FY 2003.

- Monitoring results

The presence of the substance in surface water was monitored at 48 sites, and it was detected at 1 of the 48 valid sites adopting the detection limit of 2.1 ng/L, and none of the detected concentrations exceeded tr(5.1) ng/L.

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 13 of the 64 valid sites adopting the detection limit of 0.57 ng/g-dry, and none of the detected concentrations exceeded 6.2 ng/g-dry.

Stocktaking of detection of tetrabromobisphenol A in surface water and sediment in FY 2007

Tetrabromobisphenol A	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2007	nd	nd	tr(5.1)	nd	5.5[2.1]	1/48	1/48
Sediment (ng/g-dry)	2007	nd	nd	6.2	nd	1.5[0.57]	26/192	13/64

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 1 of the 7 valid areas adopting the detection limit of 0.06 ng/g-wet, and none of the detected concentrations exceeded tr(0.09) ng/g-wet. For fish, the substance was monitored in 16 areas and detected in 4 of the 16 valid areas adopting the detection limit of 0.06 ng/g-wet, and none of the detected concentrations exceeded tr(0.09) ng/g-wet. For birds, the substance was monitored in 2 areas and it was detected in none of 2 valid areas adopting the detection limit of 0.06 ng/g-wet.

Stocktaking of detection of tetrabromobisphenol A in wildlife (bivalves, fish and birds) in FY 2007

Tetrabromobisphenol A	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (ng/g-wet)	2007	nd	nd	tr(0.09)	nd	0.18[0.06]	2/31	1/7
Fish (ng/g-wet)	2007	nd	nd	tr(0.09)	nd	0.18[0.06]	7/80	4/16
Birds (ng/g-wet)	2007	nd	nd	nd	nd	0.18[0.06]	0/10	0/2

[17] Hexachlorobuta-1,3-diene

- History and state of monitoring

Hexachlorobuta-1,3-diene had been used as pesticides (including intermediates) and intermediates for organic synthesis and on April 1 in 2005 it was designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law. Under the framework of "the Environmental Survey and Monitoring of Chemicals", the substance was not detected in surface water and in sediment in FY 1981.

- Monitoring results

The presence of the substance in surface water was monitored at 48 sites, and it was detected in none of 48 valid sites adopting the detection limit of 0.34 ng/L.

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 10 of the 64 valid sites adopting the detection limit of 0.0085 ng/g-dry, and none of the detected concentrations exceeded 1.3 ng/g-dry.

Stocktaking of detection of hexachlorobuta-1,3-diene in surface water and sediment in FY 2007

Hexachlorobuta-1,3-diene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2007	nd	nd	nd	nd	0.87[0.34]	0/48	0/48
Sediment (ng/g-dry)	2007	nd	nd	1.3	nd	0.022[0.0085]	22/192	10/64

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in none of 7 valid areas adopting the detection limit of 0.012 ng/g-wet. For fish, the substance was monitored in 16 areas and it was detected in none of 16 valid areas adopting the detection limit of 0.012 ng/g-wet. For birds, the substance was monitored in 2 areas and it was detected in none of 2 valid areas adopting the detection limit of 0.012 ng/g-wet.

Stocktaking of detection of hexachlorobuta-1,3-diene in wildlife (bivalves, fish and birds) in FY 2007

Hexachlorobuta-1,3-diene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (ng/g-wet)	2007	nd	nd	nd	nd	0.036[0.012]	0/31	0/7
Fish (ng/g-wet)	2007	nd	nd	nd	nd	0.036[0.012]	0/80	0/16
Birds (ng/g-wet)	2007	nd	nd	nd	nd	0.036[0.012]	0/10	0/2

[18] Hexabromobenzene

- History and state of monitoring

Hexabromobenzene is used as a flame retardant for thermoplastics, thermosets, synthetic fiber and synthetic rubber. Under the framework of "the Environmental Survey and Monitoring of Chemicals", the substance was detected in sediment in FY 1981, in sediment in FY 1982, and in sediment and in air in FY 2000.

Under the framework of the Environmental Monitoring, the substance was monitored in surface water, in sediment, in wildlife (bivalves, fish and birds) and in air and detected in sediment, wildlife (fish) and in air in FY 2004.

- Monitoring results

The presence of the substance in surface water was monitored at 48 sites, and it was detected in none of 48 valid sites adopting the detection limit of 2.1 ng/L.

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 21 of the 64 valid sites adopting the detection limit of 1.1 ng/g-dry, and none of the detected concentrations exceeded 15 ng/g-dry.

Stocktaking of detection of hexabromobenzene in surface water and sediment in FY 2004 and FY 2007

Hexabromobenzene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2004	nd	nd	nd	nd	2[0.6]	0/38	0/38
	2007	nd	nd	nd	nd	5.4[2.1]	0/48	0/48
Sediment (ng/g-dry)	2004	nd	nd	34	nd	2.7[0.9]	31/189	15/63
	2007	nd	nd	15	nd	2.8[1.1]	44/192	21/64

The presence of the substance in bivalves was monitored in 7 areas, and was detected in none of 7 valid areas adopting the detection limit of 0.1 ng/g-wet. For fish, the substance was monitored in 16 areas and detected in 6 of the 16 valid areas adopting the detection limit of 0.1 ng/g-wet, and none of the detected concentrations exceeded tr(0.2) ng/g-wet. For birds, the substance was monitored in 2 areas and detected in 1 of the 2 valid areas adopting the detection limit of 0.1 ng/g-wet, and none of the detected concentrations exceeded tr(0.2) ng/g-wet.

Stocktaking of detection of hexabromobenzene in wildlife (bivalves, fish and birds) in FY 2004 and FY 2007

Hexabromobenzene	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (ng/g-wet)	2004	nd	nd	nd	nd	0.3[0.1]	0/31	0/7
	2007	nd	nd	nd	nd	0.3[0.1]	0/31	0/7
Fish (ng/g-wet)	2004	nd	nd	tr(0.12)	nd	0.3[0.1]	1/70	1/14
	2007	nd	nd	tr(0.2)	nd	0.3[0.1]	8/80	6/16
Birds (ng/g-wet)	2004	nd	nd	nd	nd	0.3[0.1]	0/10	0/2
	2007	nd	nd	tr(0.2)	nd	0.3[0.1]	3/10	1/2