Chapter 3 Results of the Environmental Monitoring in FY 2006

1. Purpose of the monitoring

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

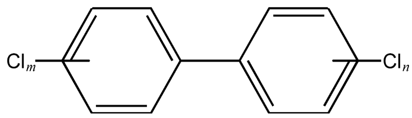
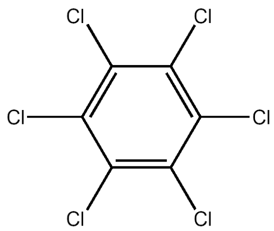
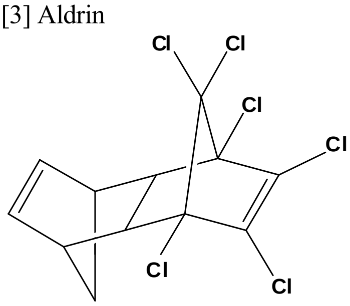
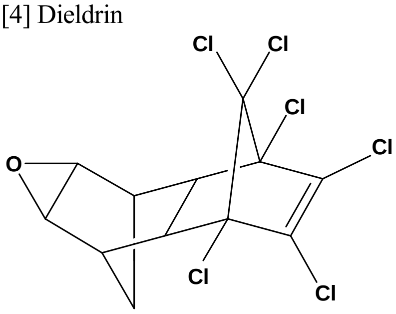
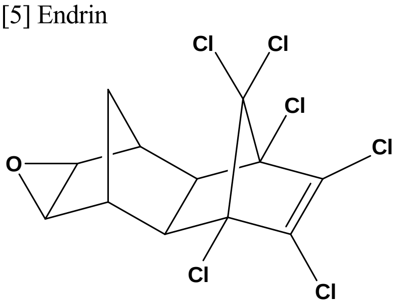
2. Target chemicals

In the FY 2006 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, 2-chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym: atrazine), 2,2,2-trichloro-1,1-bis(4-chlorophenyl) ethanol (synonym: kelthane or dicofol), 2,4,6-tri-*tert*-butylphenol, di-*n*-butyl phthalate, polychlorinated naphthalenes, dioctyltin compounds, and tri-*n*-butyl phosphate, were designated as target chemicals. The combinations of target chemicals and the monitored 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]	2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym: Atrazine)			○	
[13]	2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym: Kelthane or Dicofol)			○	
[14]	2,4,6-Tri-*tert*-butylphenol			○	○
[15]	Di-*n*-butyl phthalate			○	
[16]	Polychlorinated naphthalenes [16-1] Monochlorinated naphthalenes [16-1-1] 2-Chloronaphthalene [16-2] Dichlorinated naphthalenes [16-2-1] 1,5-Dichlorinated naphthalene [16-2-2] 2,7-Dichlorinated naphthalene [16-3] Trichlorinated naphthalenes [16-3-1] 1,2,3-Trichlorinated naphthalene [16-4] Tetrachlorinated naphthalenes [16-4-1] 1,2,3,4-Tetrachlorinated naphthalene [16-4-2] 1,2,3,8-Tetrachlorinated naphthalene [16-4-3] 1,2,5,6-及び 1,2,3,5-Tetrachlorinated naphthalene [16-4-4] 1,4,5,8-Tetrachlorinated naphthalene [16-4-5] 2,3,6,7-Tetrachlorinated naphthalene [16-5] Pentachlorinated naphthalenes [16-5-1] 1,2,3,4,6-Pentachlorinated naphthalene [16-5-2] 1,2,3,5,7-Pentachlorinated naphthalene [16-5-3] 1,2,3,5,8-Pentachlorinated naphthalene [16-6] Hexachlorinated naphthalenes [16-6-1] 1,2,3,4,6,7-Hexachlorinated naphthalene [16-6-2] 1,2,3,5,7,8-Hexachlorinated naphthalene [16-6-3] 1,2,4,5,7,8-Hexachlorinated naphthalene [16-7] Heptachlorinated naphthalenes [16-7-1] 1,2,3,4,5,6,7-Heptachlorinated naphthalene [16-8] Octachlorinated naphthalene			○	
[17]	Dioctyltin compounds			○	
[18]	Tri-*n*-butyl phosphate			○	

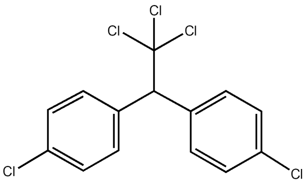
Chemical and physical properties of target chemicals of the Environmental Monitoring are as follows.

[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.

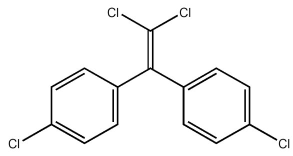
[6] DDTs

[6-1] *p,p′*-DDT



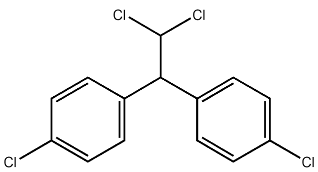
Molecular formula: $C_{14}H_9Cl_5$
CAS: 50-29-3
ENCS: 4-0910
MW: 354.49
mp: 108.5°C[4]
bp: 260°C[4]
SW: 0.0055mg/L (25°C)[5]
Specific gravity: 0.98～0.99[13]
logPow: 6.91[6]

[6-2] *p,p′*-DDE



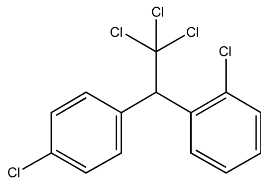
Molecular formula: $C_{14}H_8Cl_4$
CAS: 72-55-9
ENCS: Not identified
MW: 318.03
mp: 89°C[4]
bp: Uncertain
SW: 0.04mg/L (25°C)[5],
0.065mg/L (24°C)[14]
Specific gravity: Uncertain
logPow: 6.51[6]

[6-3] *p,p′*-DDD



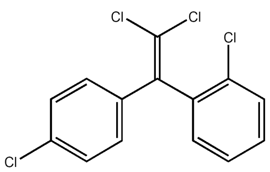
Molecular formula: $C_{14}H_{10}Cl_4$
CAS: 72-54-8
ENCS: Not identified
MW: 320.04
mp: 109～110°C[7]
bp: 193°C (1mmHg)[4]
SW: 0.16mg/L[14]
Specific gravity: 1.385[4]
logPow: 6.02[6]

[6-4] *o,p′*-DDT



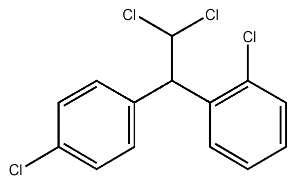
Molecular formula: $C_{14}H_9Cl_5$
CAS: 789-02-6
ENCS: Not identified
MW: 354.49
mp: Uncertain
bp: Uncertain
SW: Uncertain
Specific gravity: Uncertain
logPow: Uncertain

[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

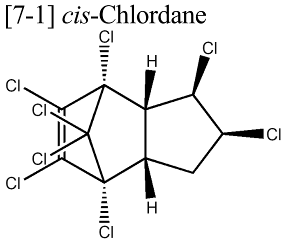
[6-6] *o,p′*-DDD



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

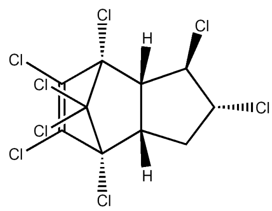
[7] Chlordanes

[7-1] *cis*-Chlordane



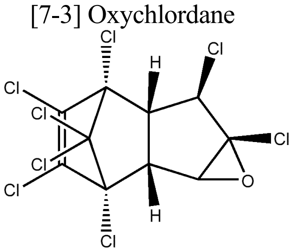
Molecular formula: $C_{10}H_6Cl_8$
CAS: 5103-71-9
ENCS: 4-637
MW: 409.78
mp: 106～107°C[2]
bp: 175°C (1mmHg)[2]
SW: Insoluble[7]
Specific gravity: 1.59～1.63 (25°C)[7]
logPow: 6.16[6]

[7-2] *trans*-Chlordane



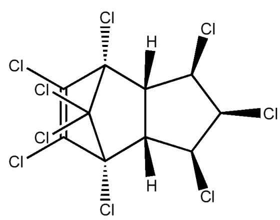
Molecular formula: $C_{10}H_6Cl_8$
CAS: 5103-74-2
ENCS: 4-637
MW: 409.78
mp: 104～105°C[2]
bp: 175°C (1mmHg)[2]
SW: Insoluble[7]
Specific gravity: 1.59～1.63 (25°C)[7]
logPow: 6.16[6]

[7-3] Oxychlordane



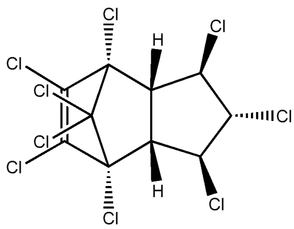
Molecular formula: $C_{10}H_4Cl_8O$
CAS: 26880-48-8
ENCS: Not identified
MW: 423.76
mp: 98～101°C[7]
bp: Uncertain
SW: Insoluble[7]
Specific gravity: Uncertain
logPow: 4.76[6]

[7-4] *cis*-Nonachlor



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

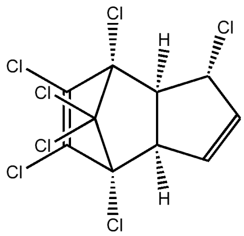
[7-5] *trans*-Nonachlor



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]

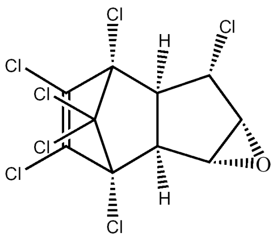
[8] Heptachlors

[8-1] Heptachlor

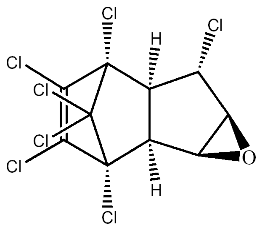


Molecular formula: $C_{10}H_5Cl_7$
CAS: 76-44-8
ENCS: 4-637, 9-1646
MW: 373.32
mp: 95～96℃[7]
bp: 145℃ (1.5mmHg)[4]
SW: 0.18mg/L (25℃)[10]
Specific gravity: 1.57 (9℃)[4]
logPow: 6.10[6]

[8-2] *cis*-Heptachlor epoxide



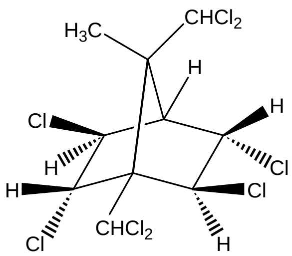
[8-3] *trans*-Heptachlor epoxide



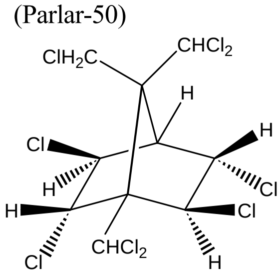
The following data are for both [8-2] and [8-3].
Molecular formula: $C_{10}H_5Cl_7O$
CAS: 1024-57-3
ENCS: Not identified
MW: 389.32
mp: 160～161.5℃[2]
bp: Uncertain
SW: 0.275mg/L[5]
Specific gravity: 1.58[7]
logPow: 5.40[6]

[9] Toxaphenes

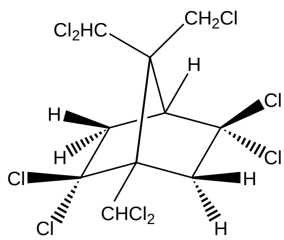
[9-1]
2-Endo,3-exo,5-endo,6-exo,
8,8,10,10-octachlorobornane
(Parlar-26)



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

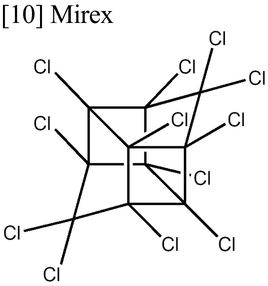


[9-3]
2,2,5,5,8,9,9,10,10-nonac
hlorobornane (Parlar-62)



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 [9-1].
mp: 65～90℃[11]
bp: Uncertain
SW: 0.55mg/L (20℃)[15]
Specific gravity: 1.65 (25℃)[14]
logPow: 5.90[16]

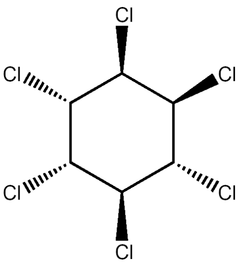
[10] Mirex



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

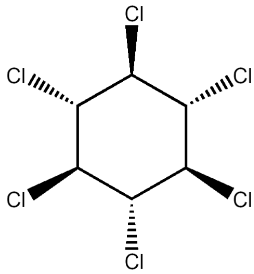
[11] HCHs (Hexachlorohexanes)

[11-1] α-HCH



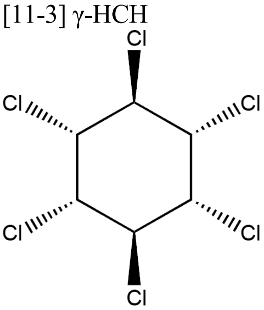
Molecular formula: $C_6H_6Cl_6$
CAS: 319-84-6
ENCS: 3-2250, 9-1652
MW: 290.83
mp: 158°C[1]
bp: 288°C[18]
SW: 2mg/L[2]
Specific gravity: 1.87 (20°C)[19]
logPow: 3.8[6]

[11-2] β-HCH



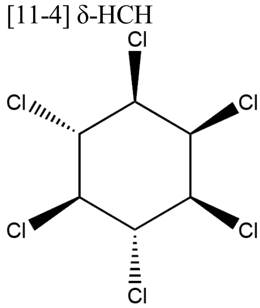
Molecular formula: $C_6H_6Cl_6$
CAS: 319-85-7
ENCS: 3-2250, 9-1652
MW: 290.83
mp: 309°C[20]
bp: 60°C[2]
SW: 5mg/L[2]
Specific gravity: 1.87 (20°C)[19]
logPow: 3.78[1]

[11-3] γ-HCH



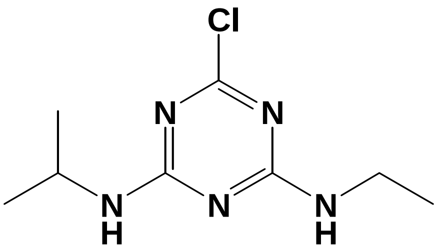
Molecular formula: $C_6H_6Cl_6$
CAS: 58-89-9
ENCS: 3-2250, 9-1652
MW: 290.83
mp: 112.5°C[7]
bp: 323.4°C[4]
SW: 7.3mg/L[5]
Specific gravity: 1.85 (20°C)[19]
logPow: 3.72[6]

[11-4] δ-HCH



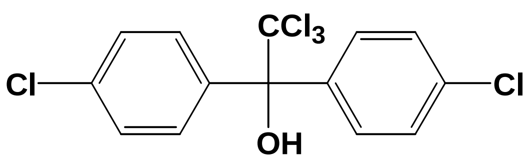
Molecular formula: $C_6H_6Cl_6$
CAS: 319-86-8
ENCS: 3-2250, 9-1652
MW: 290.83
mp: 141.5°C[4]
bp: 60°C (0.36mmHg)[4]
SW: 21.3mg/L[2]
Specific gravity: 1.87 (20°C)[19]
logPow: 4.14[6]

［12］ 2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym: Atrazine)



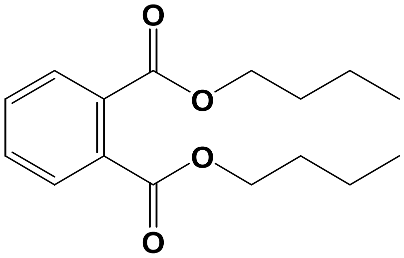
Molecular formula: $C_8H_{14}ClN_5$
CAS: 1912-24-9
ENCS: 5-3851
MW: 215.68
mp: 171～174°C[7]
bp: Uncertain
SW: 70mg/L（25°C）[7]
Specific gravity: 1.23（22°C）[20]
logPow: 2.34[6]

［13］ 2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym: Kelthane or Dicofol)



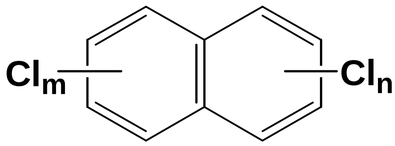
Molecular formula: $C_{14}H_9Cl_5O$
CAS: 115-32-2
ENCS: 4-226
MW: 370.49
mp: 77～78°C[7]
bp: 180°C（0.1mmHg）[4]
SW: 1.32mg/L（25°C）[21]
Specific gravity: 1.13[21]
logPow: 3.54[6]

［15］Di-*n*-butyl phthalate



Molecular formula: $C_{16}H_{22}O_4$
CAS: 84-74-2
ENCS: 3-1303
MW: 278.34
mp: -35°C[4)]
bp: 340°C[7)]
SW: 11.2mg/L（25°C）[21)]
Specific gravity: 1.05（20°C）[4)]
logPow: 4.50[22)]

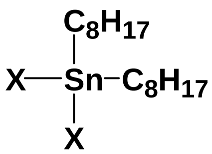
［16］Polychlorinated naphthalenes



i = m+n =1～8

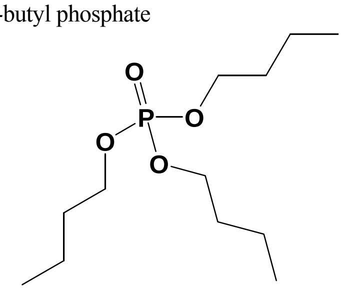
Molecular formula: $C_8H_{(8-i)}Cl_i$（i = m+n =1～8）
CAS: 70776-03-3, 255860-43-0（i = 1), 28699-88-9（i = 2), 1321-65-9 (i = 3), 1335-88-2 (i = 4), 1321-64-8 (i = 5), 1335-87-1（i = 6), 32241-08-0（i = 7), 2234-13-1（i = 8)
ENCS: 4-316（i = 1), 4-317（I = 3～5)
MW: 138.59～379.71
mp: Dependent on the molecule
bp: Dependent on the molecule
SW: Dependent on the molecule
Specific gravity: Dependent on the molecule
logPow: Dependent on the molecule

［17］Dioctyltin compounds



Molecular formula: Dependent on the molecule
CAS: Dependent on the molecule
ENCS: Dependent on the molecule
MW: Dependent on the molecule
mp: Dependent on the molecule
bp: Dependent on the molecule
SW: Dependent on the molecule
Specific gravity: Dependent on the molecule
logPow: Dependent on the molecule

［18］Tri-*n*-butyl phosphate



Molecular formula: $C_{12}H_{27}O_4P$
CAS: 126-73-8
ENCS: 2-2021
MW: 266.31
mp: <-80°C[1)]
bp: 289°C[4)]
SW: 280mg/L（25°C）[23)]
Specific gravity: 0.973（25°C）[4)]
logPow: 4.00[6)]

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3. Monitored site and procedure

In the Environmental Monitoring (of surface water, sediment, and wildlife), the sampling of specimens was entrusted to prefectural governments and government-designated cities across Japan and the sampled specimens 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 Pref.	Hachinohe Environmental Management Office, Aomori Prefectural Institute of Public Health and Environment			○	
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.	Osaka Prefecture Environmental Pollution Control Center	○	○	○	○
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	○	○		○

Local communities	Organisations responsible for sampling	Monitored media			
		Surface water	Sediment	Wildlife	Air
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 Pref.	Hiroshima Prefectural Institute of Public Health and Environment	○	○		
Hiroshima City	Hiroshima City Institute of Public Health			○	○
Yamaguchi Pref.	Yamaguchi Prefectural Institute of Public Health and Environment	○	○		○
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 2006.

(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	11	48	1
Sediment	48	11	64	3
Wildlife (fish)	7	18	7	5
Wildlife (bivalves)	14	18	16	5
Wildlife (birds)	2	18	2	5
Air (warm season)	35	12	37	1
Air (cold season)	35	12	37	1

List of monitored sites (surface water) in the Environmental Monitoring in FY 2006

Local communities	Monitored sites	Sampling dates
Hokkaido	Suzuran-ohashi Bridge, Riv Tokachi (Obihiro City)	October 11, 2006
	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari (Ishikari City)	October 3, 2006
Aomori Pref.	Lake Jusan	October 2, 2006
Iwate Pref.	Riv. Toyosawa (Hanamaki City)	October 17, 2006
Miyagi Pref.	Sendai Bay (Matsushima Bay)	October 2, 2006
Akita Pref.	Lake Hachiro	October 24, 2006
Yamagata Pref.	Mouth of Riv. Mogami (Sakata City)	October 5, 2006
Fukushima Pref.	Onahama Port	November 30, 2006
Ibaraki Pref.	Tonekamome-ohasi Bridge, Mouth of Riv. Tone (Kamisu City)	October 18, 2006
Tochigi Pref.	Riv. Tagawa (Utsunomiya City)	October 11, 2006
Chiba City	Mouth of Riv. Hanami (Chiba City)	November 29, 2006
Tokyo	Mouth of Riv. Arakawa (Koto Ward)	October 19, 2006
	Mouth of Riv. Sumida (Minato Ward)	October 19, 2006
Yokohama City	Yokohama Port	November 7, 2006
Kawasaki City	Keihin Canal, Port of Kawasaki	November 13, 2006
Niigata Pref.	Lower Riv. Shinano (Niigata City)	September 20, 2006
Toyama Pref.	Hagiura-bashi Bridge, Mouth of Riv. Jintsu (Toyama City)	September 27, 2006
Ishikawa Pref.	Mouth of Riv. Sai (Kanazawa City)	September 29, 2006
Fukui Pref.	Mishima-bashi Bridge, Riv. Shono (Tsuruga City)	November 8, 2006
Nagano Pref.	Lake Suwa (center)	October 10, 2006
Shizuoka Pref.	Riv. Tenryu (Iwata City)	October 18, 2006
Aichi Pref.	Nagoya Port	September 25, 2006
Mie Pref.	Yokkaichi Port	October 24, 2006
Shiga Pref.	Lake Biwa (center, offshore of Karasaki)	October 31, 2006
Kyoto Pref.	Miyazu Port	October 11, 2006
Kyoto City	Miyamae-bashi Bridge, Miyamae Bridge, Riv. Katsura (Kyoto City)	October 17, 2006
Osaka Pref.	Mouth of Riv. Yamato (Sakai City)	November 14, 2006
Osaka City	Osaka Port	November 21, 2006
Hyogo Pref.	Offshore of Himeji	October 23, 2006
Kobe City	Kobe Port (center)	October 11, 2006
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa (Wakayama City)	October 31, 2006
Okayama Pref.	Offshore of Mizushima	October 16, 2006
Hiroshima Pref.	Kure Port	November 8, 2006
	Hiroshima Bay	November 8, 2006
Yamaguchi Pref.	Tokuyama Bay	October 18, 2006
	Offshore of Ube	October 10, 2006
	Offshore of Hagi	November 2, 2006
Tokushima Pref.	Mouth of Riv. Yoshino (Tokushima City)	September 21, 2006
Kagawa Pref.	Takamatsu Port	October 23, 2006
Kochi Pref.	Mouth of Riv. Shimanto (Shimanto City)	October 16, 2006
Kitakyushu City	Dokai Bay	October 30, 2006
Nagasaki Pref.	Omura Bay	November 8, 2006
Saga Pref.	Imari Bay	December 20, 2006
Kumamoto Pref.	Riv. Midori (Uto City)	December 6, 2006
Miyazaki Pref.	Mouth of Riv. Oyodo (Miyazaki City)	September 26, 2006
Kagoshima Pref.	Riv. Amori (Hayato Town)	November 1, 2006
	Gotanda-bashi Bridge, Riv. Gotanda (Ichikikushikino City)	October 4, 2006
Okinawa Pref.	Naha Port	November 27, 2006

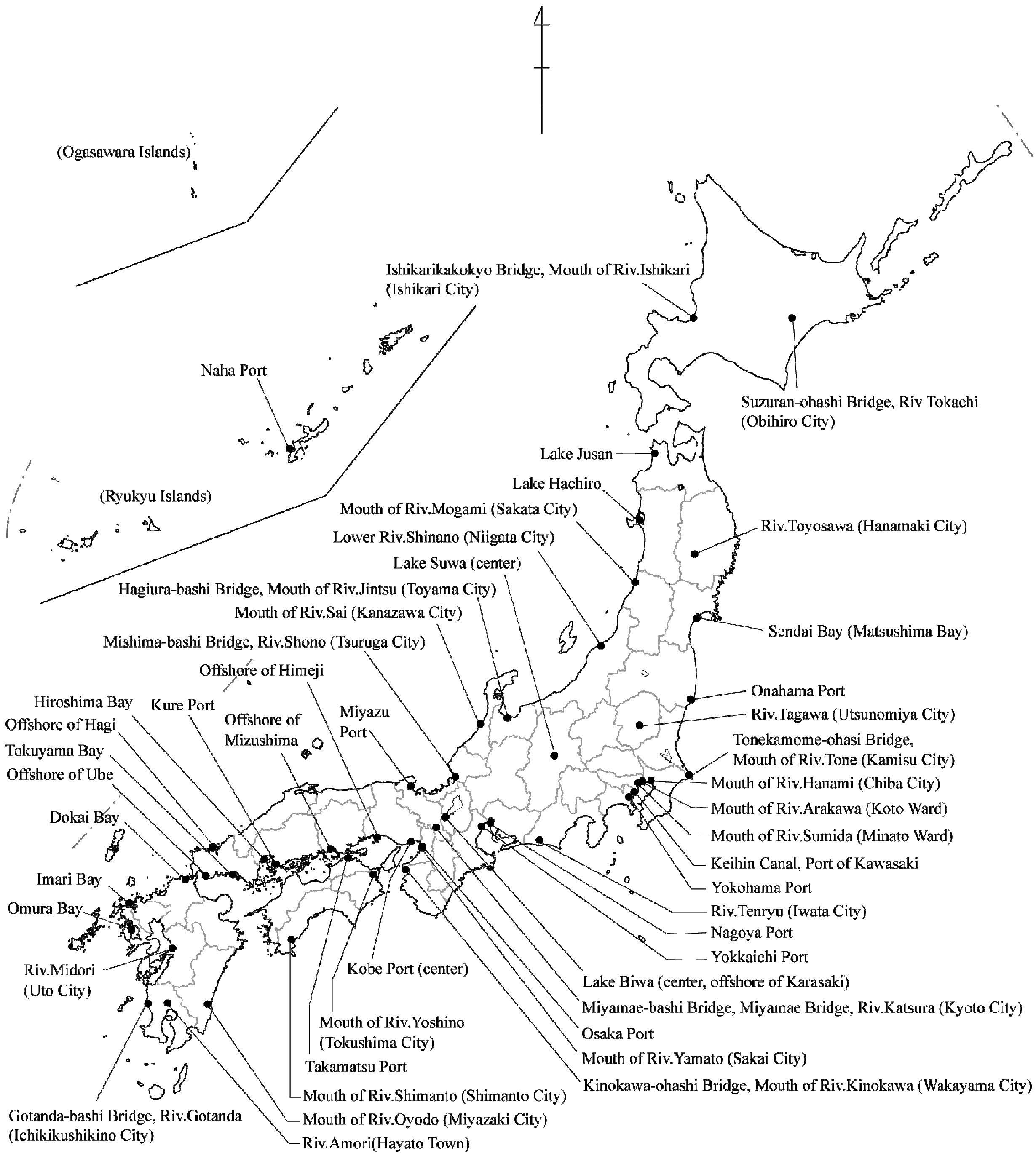

Figure 3-1-1 Monitored sites (surface water) in the Environmental Monitoring in FY 2006

List of monitored sites (sediment) in the Environmental Monitoring in FY 2006

Local communities	Monitored sites	Sampling dates
Hokkaido	Onnenai-ohashi Bridge, Riv. Teshio (Bifuka Town)	October 10, 2006
	Suzuran-ohashi Bridge, Riv Tokachi (Obihiro City)	October 11, 2006
	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari (Ishikari City)	October 3, 2006
	Tomakomai Port	September 27, 2006
Aomori Pref.	Lake Jusan	October 2, 2006
Iwate Pref.	Riv. Toyosawa (Hanamaki City)	October 17, 2006
Miyagi Pref.	Sendai Bay (Matsushima Bay)	October 2, 2006
Sendai City	Hirose-ohashi Bridge, Riv. Hirose (Sendai City)	December 6, 2006
Akita Pref.	Lake Hachiro	October 24, 2006
Yamagata Pref.	Mouth of Riv. Mogami (Sakata City)	October 5, 2006
Fukushima Pref.	Onahama Port	November 30, 2006
Ibaraki Pref.	Tonekamome-ohasi Bridge, Mouth of Riv. Tone (Kamisu City)	October 18, 2006
Tochigi Pref.	Riv. Tagawa (Utsunomiya City)	October 11, 2006
Chiba Pref.	Coast of Ichihara and Anegasaki	October 10, 2006
Chiba City	Mouth of Riv. Hanami (Chiba City)	November 29, 2006
Tokyo	Mouth of Riv. Arakawa (Koto Ward)	October 19, 2006
	Mouth of Riv. Sumida (Minato Ward)	October 19, 2006
Yokohama City	Yokohama Port	November 7, 2006
Kawasaki City	Mouth of Riv. Tama (Kawasaki City)	November 13, 2006
	Keihin Canal, Port of Kawasaki	November 13, 2006
Niigata Pref.	Lower Riv. Shinano (Niigata City)	September 20, 2006
Toyama Pref.	Hagiura-bashi Bridge, Mouth of Riv. Jintsu (Toyama City)	September 27, 2006
Ishikawa Pref.	Mouth of Riv. Sai (Kanazawa City)	September 29, 2006
Fukui Pref.	Mishima-bashi Bridge, Riv. Shono (Tsuruga City)	November 8, 2006
Yamanashi Pref.	Senshu-bashi Bridge, Riv. Arakawa (Kofu City)	November 13, 2006
Nagano Pref.	Lake Suwa (center)	October 10, 2006
Shizuoka Pref.	Shimizu Port	October 31, 2006
	Riv. Tenryu (Iwata City)	October 18, 2006
Aichi Pref.	Kinuura Port	September 25, 2006
	Nagoya Port	September 25, 2006
Mie Pref.	Yokkaichi Port	October 24, 2006
	Toba Port	October 17, 2006
Shiga Pref.	Lake Biwa (center, offshore of Minamihira)	October 31, 2006
	Lake Biwa (center, offshore of Karasaki)	October 31, 2006
Kyoto Pref.	Miyazu Port	October 11, 2006
Kyoto City	Miyamae Bridge, Miyamae Bridge, Riv. Katsura (Kyoto City)	October 17, 2006
Osaka Pref.	Mouth of Riv. Yamato (Sakai City)	November 14, 2006
Osaka City	Osaka Port	November 21, 2006
	Outside Osaka Port	November 21, 2006
	Mouth of Riv. Yodo (Osaka City)	November 21, 2006
	Riv. Yodo (Osaka City)	November 15, 2006
Hyogo Pref.	Offshore of Himeji	October 23, 2006
Kobe City	Kobe Port (center)	October 11, 2006
Nara Pref.	Riv. Yamato (Ooji Town)	October 10, 2006
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa (Wakayama City)	October 31, 2006
Okayama Pref.	Offshore of Mizushima	October 16, 2006
Hiroshima Pref.	Kure Port	November 8, 2006
	Hiroshima Bay	November 8, 2006
Yamaguchi Pref.	Tokuyama Bay	October 18, 2006
	Offshore of Ube	October 10, 2006
	Offshore of Hagi	November 2, 2006
Tokushima Pref.	Mouth of Riv. Yoshino (Tokushima City)	September 21, 2006
Kagawa Pref.	Takamatsu Port	October 23, 2006
Ehime Pref.	Niihama Port	October 23, 2006
Kochi Pref.	Mouth of Riv. Shimanto (Shimanto City)	October 16, 2006
Kitakyushu City	Dokai Bay	October 30, 2006

Local communities	Monitored sites	Sampling dates
Fukuoka City	Hakata Bay	November 6, 2006
Nagasaki Pref.	Omura Bay	November 8, 2006
Saga Pref.	Imari Bay	December 20, 2006
Oita Pref.	Mouth of Riv. Oita (Oita City)	December 19, 2006
Miyazaki Pref.	Mouth of Riv. Oyodo (Miyazaki City)	September 26, 2006
Kagoshima Pref.	Riv. Amori (Hayato Town)	November 1, 2006
	Gotanda-bashi Bridge, Riv. Gotanda (Ichikikushikino City)	October 4, 2006
Okinawa Pref.	Naha Port	November 27, 2006

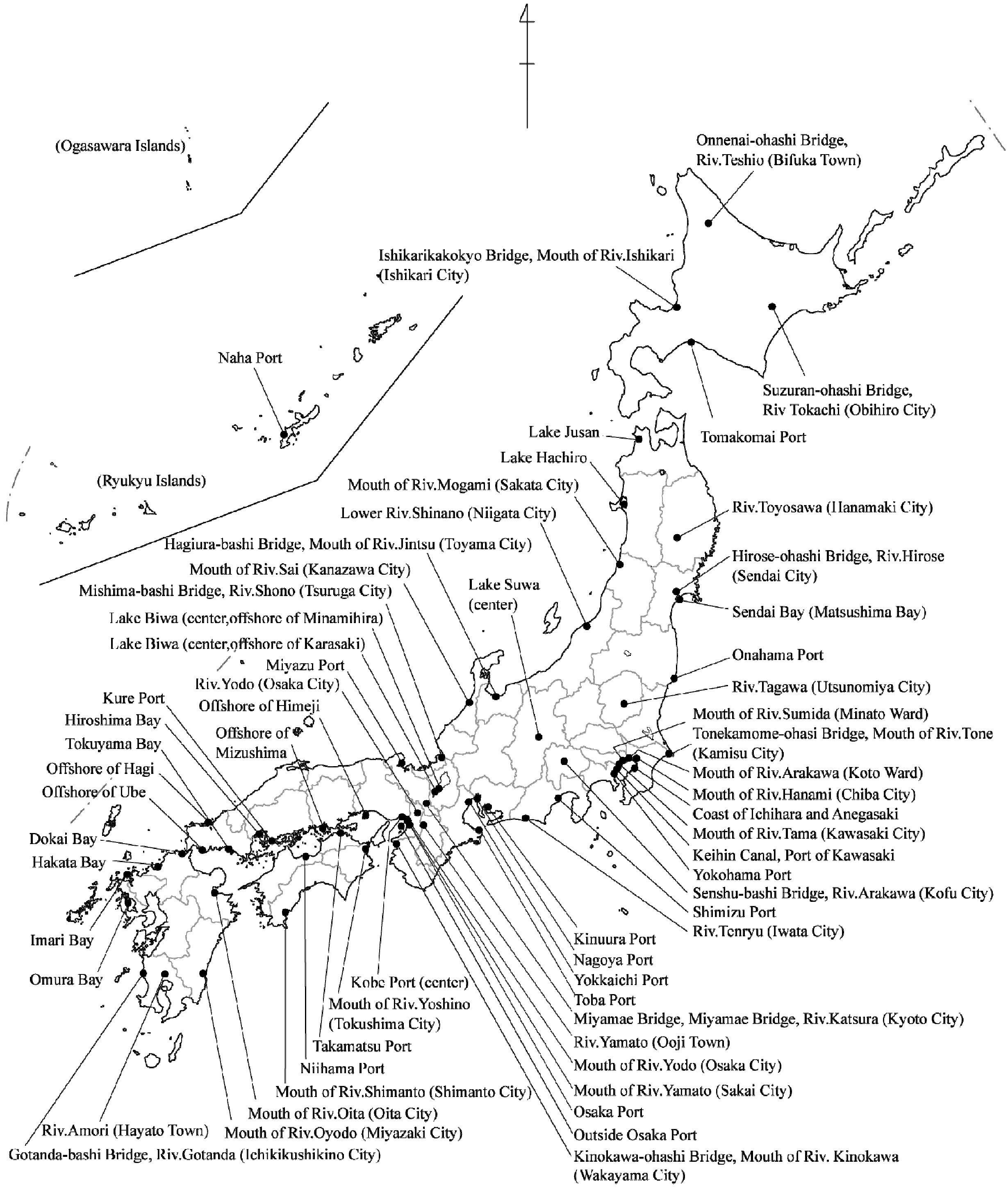

Figure 3-1-2 Monitored sites (sediment) in the Environmental Monitoring in FY 2006

List of monitored areas (wildlife) in the Environmental Monitoring in FY 2006

Local communities	Monitored areas	Sampling dates	Wildlife species	
Hokkaido	Offshore of Kushiro	October 30, 2006 November 6, 2006	Fish	Rock greenling (*Hexagrammos otakki*)
		October 23, 2006 November 6, 2006	Fish	Chum salmon (*Oncorhynchus keta*)
	Offshore of Japan Sea (offshore of Iwanai)	December 12, 2006	Fish	Greenling (*Hexagrammos lagocephalus*)
Aomori Pref.	Kabu Is. (Hachinohe City)	July 3～14, 2006	Birds	Black-taild gull (*Larus crassirostris*)
Iwate Pref.	Yamada Bay	November 25, 2006 November 30, 2006	Bivalves	Blue mussel (*Mytilus galloprovincialis*)
			Fish	Greenling (*Hexagrammos lagocephalus*)
	Suburb of Morioka City	October 14, 2006	Birds	Gray starling (*Sturnus cineraceus*)
Miyagi Pref.	Sendai Bay (Matsushima Bay)	September 26, 2006	Fish	Sea bass (*Lateolabrax japonicus*)
Ibaraki Pref.	Offshore of Joban	October 28, 2006	Fish	Pacific saury (*Cololabis saira*)
Tokyo Met.	Tokyo Bay	September 7, 2006	Fish	Sea bass (*Lateolabrax japonicus*)
Yokohama City	Yokohama Port	January 31, 2007	Bivalves	Blue mussel (*Mytilus galloprovincialis*)
Kawasaki City	Offshore of Ogishima Island, Port of Kawasaki	September 29, 2006	Fish	Sea bass (*Lateolabrax japonicus*)
Ishikawa Pref.	Coast of Noto Peninsula	November 17, 2006	Bivalves	Blue mussel (*Mytilus galloprovincialis*)
Shiga Pref.	Lake Biwa, Riv. Azumi (Takashima City)	April 19, 2006	Fish	Dace (*Tribolodon hakonensis*)
Osaka Pref.	Osaka Bay	August 20, 2006	Fish	Sea bass (*Lateolabrax japonicus*)
Hyogo Pref.	Offshore of Himeji	November 10, 2006 November 24, 2006	Fish	Sea bass (*Lateolabrax japonicus*)
Tottori Pref.	Nakaumi	December 6, 2006	Fish	Sea bass (*Lateolabrax japonicus*)
Shimane Pref.	Shichirui Bay, Shimane Peninsula	September 25, 2006	Bivalves	Blue mussel (*Mytilus galloprovincialis*)
Hiroshima City	Hiroshima Bay	November 27, 2006	Fish	Sea bass (*Lateolabrax japonicus*)
Tokushima Pref.	Naruto	October 30, 2006	Bivalves	Hard-shelled mussel (*Mytilus coruscus*)
Kagawa Pref.	Takamatsu Port	October 3, 2006	Bivalves	Hard-shelled mussel (*Mytilus coruscus*)
Kochi Pref.	Mouth of Riv. Shimanto (Shimanto City)	October 29, 2006	Fish	Sea bass (*Lateolabrax japonicus*)
Kitakyushu City	Dokai Bay	August 3, 2006	Bivalves	Blue mussel (*Mytilus galloprovincialis*)
Kagoshima Pref.	West Coast of Satsuma Peninsula	November 6～22, 2006	Fish	Sea bass (*Lateolabrax japonicus*)
Okinawa Pref.	Nakagusuku Bay	January 23～February 5, 2007	Fish	Okinawa seabream (*Acanthopagrus sivicolus*)

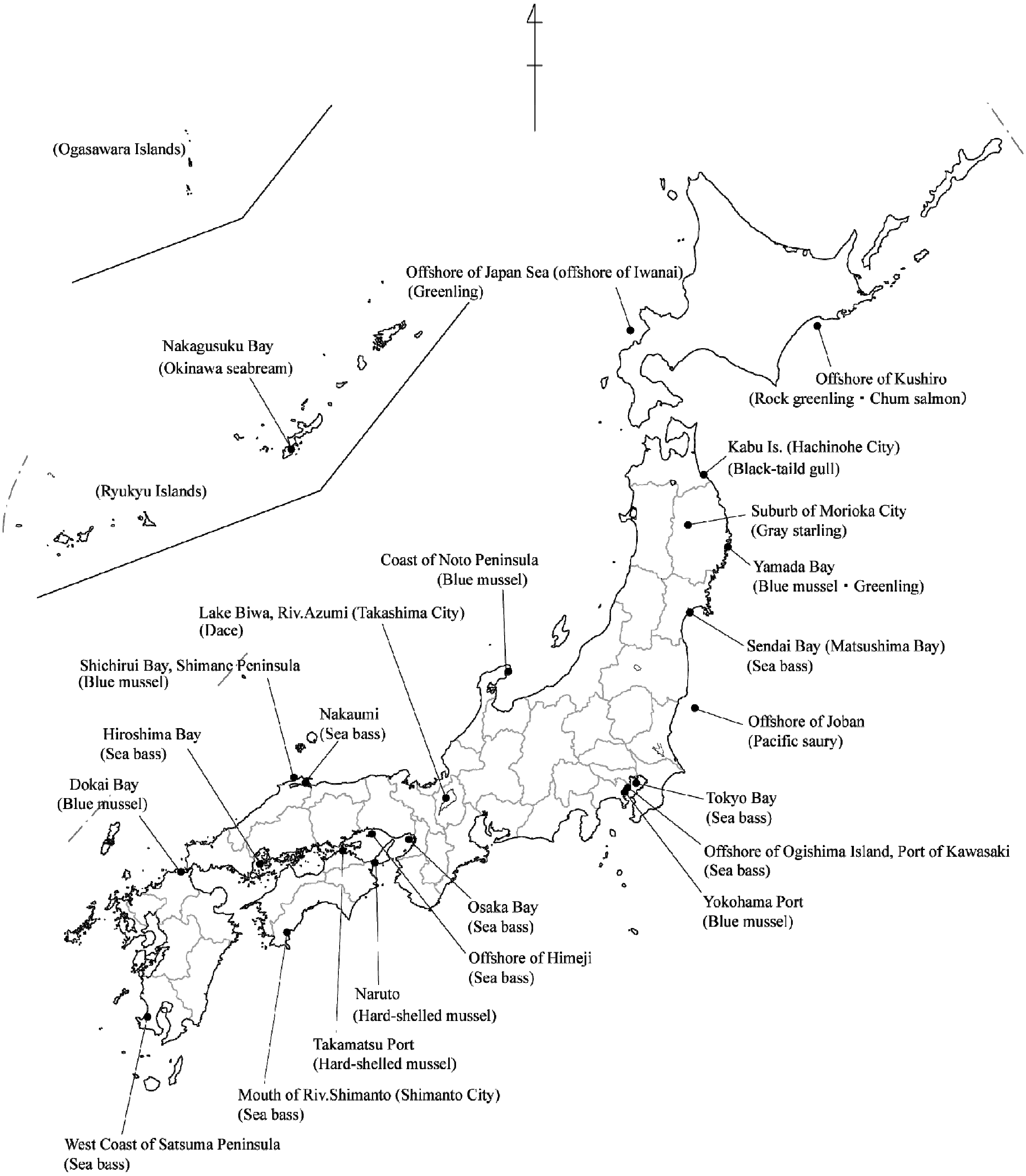

Figure 3-1-3 Monitored areas (wildlife) in the Environmental Monitoring in FY 2006

List of monitored sites (air) in the Environmental Monitoring in FY 2006

Local communities	Monitored sites	Sampling dates (Warm season)	Sampling dates (Cold season)
Hokkaido	Kushiro City Harutori Junior High School (Kushiro City)	September 5～8, 2006	December 12～15, 2006
Sapporo City	Sapporo Art Park (Sapporo City)	September 26～29, 2006	December 12～15, 2006
Iwate Pref.	Amihari Ski Area (Shizukuishi Town)	September 11～14, 2006	October 30～November 2, 2006
Miyagi Pref.	Miyagi Prefectural Institute of Public Health and Environment (Sendai City)	September 7～14, 2006	December 6～13, 2006
Ibaraki Pref.	Ibaraki Prefecture Environmental Observation Center (Mito City)	September 26～October 3, 2006	December 5～12, 2006
Gunma Pref.	Gunma Prefectural Institute of Public Health and Environmental Sciences (Maebashi City)	September 21～28, 2006	December 11～18, 2006
Chiba Pref.	Ichihara-Matsuzaki Air Quality Monitoring Station (Ichihara City)	September 26～29, 2006	November 14～17, 2006
Tokyo Met.	Tokyo Metropolitan Research Institute for Environmental Protection (Koto Ward)	September 7～14, 2006	November 21～28, 2006
	Chichijima Island	September 30～October 7, 2006	December 4～11, 2006
Kanagawa Pref.	Kanagawa Environmental Research Center (Hiratsuka City)	September 5～8, 2006	November 14～17, 2006
Yokohama City	Yokohama Environmental Science Research Institute (Yokohama City)	September 8～15, 2006	November 13～20, 2006
Niigata Pref.	Oyamadai Koen Air Quality Monitoring Station (Niigata City)	September 25～28, 2006	November 27～30, 2006
Toyama Pref.	Tonami Air Quality Monitoring Station (Tonami City)	September 26～29, 2006	November 27～30, 2006
Ishikawa Pref.	Ishikawa Prefectural Institute of Public Health and Environmental Science (Kanazawa City)	September 11～14, 2006	November 6～9, 2006
Yamanashi Pref.	Fujiyoshida Joint Prefectural Government Building (Fujiyoshida City)	September 12～15, 2006	November 7～10, 2006
Nagano Pref.	Nagano Environmental Conservation Research Institute (Nagano City)	September 26～October 3, 2006	November 27～December 4, 2006
Gifu Pref.	Gifu Prefectural Research Institute for Health and Environmental Sciences (Kakamigahara City)	September 25～28, 2006	November 13～16, 2006
Nagoya City	Chikusa Ward Heiwa Park (Nagoya City)	September 25～October 2, 2006	December 4～11, 2006
Mie Pref.	Mie Prefectural Science and Technology Promotion Center (Yokkaichi City)	September 25～28, 2006	December 18～21, 2006
Kyoto Pref.	Kyoto Prefecture Joyo Senior High School (Joyo City)	September 25～28, 2006	December 12～15, 2006
Osaka Pref.	Osaka Prefecture Environmental Pollution Control Center (Osaka City)	September 8～11, 2006	November 28～December 1, 2006
Hyogo Pref.	Hyogo Prefectural Institute of Public Health and Environmental Sciences (Kobe City)	September 19～22, 2006	December 5～8, 2006
Kobe City	Fukiai Air Quality Monitoring Station (Kobe City)	September 11～14, 2006	November 13～16, 2006
Nara Pref.	Tenri Air Quality Monitoring Station (Tenri City)	September 26～29, 2006	November 27～30, 2006
Shimane Pref.	Oki National Acid Rain Observatory (Okinoshima Town)	September 26～29, 2006	November 27～30, 2006
Hiroshima City	Hiroshima City Kokutaiji Junior High School (Hiroshima City)	September 26～29, 2006	November 13～16, 2006
Yamaguchi Pref.	Yamaguchi Prefectural Institute of Public Health and Environment (Yamaguchi City)	September 22～29, 2006	December 18～25, 2006
	Hagi City Government Building, Mishima Branch (Hagi City)	September 21～28, 2006	December 1～8, 2006
Tokushima Pref.	Tokushima Prefectural Institute of Public Health and Environmental Sciences (Tokushima City)	September 19～22, 2006	December 11～14, 2006
Kagawa Pref.	Takamatsu Joint Prefectural Government Building (Takamatsu City) Kagawa Prefectural Public Swimming Pool (Takamatsu City) as a reference site	September 25～October 2, 2006	November 27～December 4, 2006
Ehime Pref.	Ehime Prefecture Government Building, Uwajima Branch (Uwajima City)	September 19～22, 2006	November 13～16, 2006
Fukuoka Pref.	Omuta City Government Building (Omuta City)	October 2～5, 2006	December 4～7, 2006

Local communities	Monitored sites	Sampling dates (Warm season)	Sampling dates (Cold season)
Saga Pref.	Saga Prefectural Environmental Research Center (Saga City)	September 20～27, 2006	November 14～21, 2006
Kumamoto Pref.	Kumamoto Prefectural Institute of Public Health and Environmental Science (Udo City)	October 2～5, 2006	November 28～ December 1, 2006
Miyazaki Pref.	Miyazaki Prefectural Institute for Public Health and Environment (Miyazaki City)	September 7～14, 2006	December 4～11, 2006
Kagoshima Pref.	Kagoshima Prefectural Institute for Environmental Research and Public Health (Kagoshima City)	September 19～22, 2006	November 28～ December 1, 2006
Okinawa Pref.	Cape Hedo (Kunigami Village)	September 12～15, 2006	November 6～9, 2006

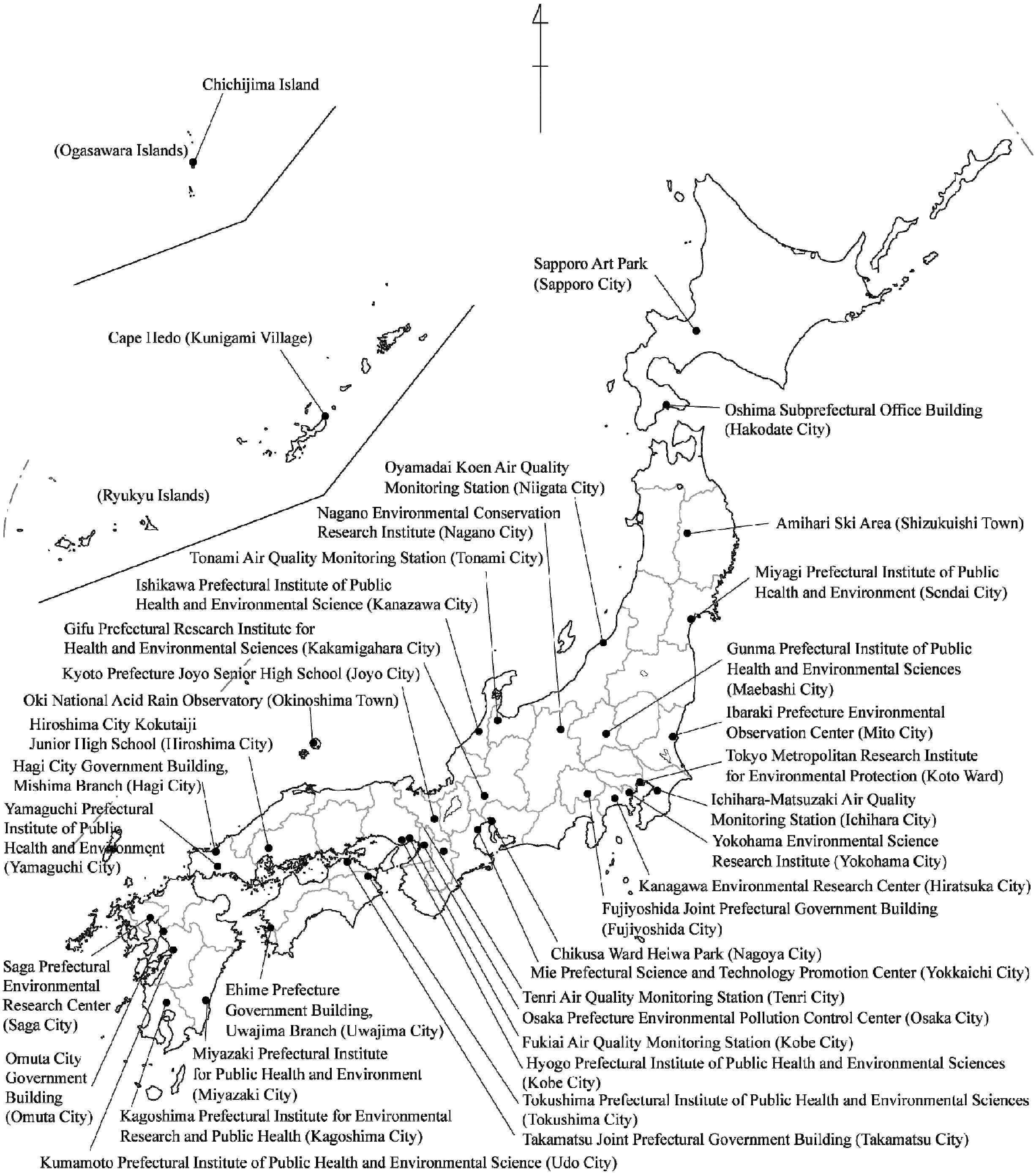

Figure 3-1-4 Monitored sites (air) in the Environmental Monitoring in FY 2006

(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 2006 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 with river influx	・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-tailed gull (*Larus crassirostris*)	① Breeds mainly in the sea off Japan ② Breeds in groups at shore reefs and in grassy fields; To understand the persistence level in specific areas	・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 2006

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, 2006	Uncertain	184	14.15 ～ 30.19 (21.66)	6.0 ～ 6.7 (6.5)	79.7	1.5
	2		Uncertain	147	18.65 ～ 41.05 (27.05)	6.8 ～ 7.3 (7.1)	79.4	1.6
	3		Uncertain	116	23.68 ～ 40.63 (34.11)	7.4 ～ 7.7 (7.6)	78.3	1.9
	4		Uncertain	120	22.92 ～ 42.48 (33.01)	7.8 ～ 8.3 (8.0)	77.9	2.0
	5		Uncertain	101	30.33 ～ 71.41 (50.76)	8.4 ～ 10.1 (9.0)	78.2	2.0
Blue mussel *Mytilus galloprovincialis* (Yokohama Port)	1	January, 2007	Uncertain	615	1.9 ～ 4.1 (2.7)	2.5 ～ 3.6 (3.1)	91.1	1.1
	2		Uncertain	552	1.7 ～ 5.2 (2.9)	2.5 ～ 4.1 (3.1)	91.4	1.1
	3		Uncertain	611	1.5 ～ 4.2 (2.6)	2.3 ～ 3.4 (2.9)	91.3	1.1
	4		Uncertain	553	1.6 ～ 5.1 (2.8)	2.7 ～ 3.8 (3.1)	91.2	1.1
	5		Uncertain	622	1.7 ～ 6.6 (2.7)	2.5 ～ 4.0 (3.1)	90.4	1.1
Blue mussel *Mytilus galloprovincialis* (Coast of Noto Peninsula)	1	November, 2006	Uncertain	61	37 ～ 101.6 (66.6)	7.5 ～ 9.8 (8.5)	79.8	2.2
	2		Uncertain	147	24.2 ～ 56.4 (37.4)	6.6 ～ 8.2 (7.5)	81.1	2.0
	3		Uncertain	268	21.4 ～ 35.9 (29.1)	5.8 ～ 8.0 (6.8)	80.3	2.2
	4		Uncertain	309	17.2 ～ 32.7 (24.6)	5.4 ～ 7.2 (6.3)	80.6	2.0
	5		Uncertain	270	12.0 ～ 28.4 (16.8)	5.0 ～ 6.5 (5.6)	80.7	2.0
Blue mussel *Mytilus galloprovincialis* (Shitirui Bay)	1	September, 2006	Uncertain	125	32.4 ～ 99.2 (65.6)	7.7 ～ 10.7 (8.9)	74.4	2.8
	2		Uncertain	212	20.3 ～ 49.2 (30.2)	6.6 ～ 7.9 (7.2)	74.0	2.4
	3		Uncertain	250	15.3 ～ 38.0 (22.7)	5.2 ～ 6.7 (6.2)	73.5	3.3
	4		Uncertain	300	10.9 ～ 23.5 (17.0)	5.0 ～ 6.3 (5.7)	74.9	2.2
	5		Uncertain	632	4.6 ～ 10.1 (7.0)	3.7 ～ 4.7 (4.2)	75.5	2.4
Hard-shelled mussel *Mytilus coruscus* (Naruto)	1	October, 2006	Mixed	21	378 ～ 726 (537)	13.0 ～ 18.5 (16)	56.3	1.1
	2		Mixed	19	357 ～ 788 (547)	13.5 ～ 18.5 (16)	52.1	1.2
	3		Mixed	19	325 ～ 746 (540)	12.5 ～ 19.0 (16)	66.0	1.0
	4		Mixed	17	402 ～ 890 (555)	14.0 ～ 19.5 (16)	64.5	1.1
	5		Mixed	17	372 ～ 924 (596)	13.5 ～ 18.5 (16)	66.6	1.1
Hard-shelled mussel *Mytilus coruscus* (Takamatsu Port)	1	October, 2006	Uncertain	85	32.5 ～ 149.9 (81.8)	6.5 ～ 11.7 (9.1)	74.00	2.85
	2		Uncertain	115	23.0 ～ 132.9 (60.0)	6.2 ～ 11.0 (8.3)	73.75	2.66
	3		Uncertain	91	29.8 ～ 91.1 (48.7)	6.8 ～ 9.9 (7.9)	72.08	2.74
	4		Uncertain	155	24.2 ～ 125.8 (46.4)	6.0 ～ 11.2 (7.9)	73.17	2.68
	5		Uncertain	80	28.3 ～ 137.8 (71.3)	6.9 ～ 10.7 (8.9)	74.55	2.36
Blue mussel *Mytilus galloprovincialis* (Dokai Bay)	1	August, 2006	Mixed	190	15.7 ～ 46.9 (26.6)	5.0 ～ 7.4 (6.2)	69.6	3.0

Table 3-2-2 Basic data of specimens (fish as wildlife) in the Environmental Monitoring in FY 2006

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	October～ November, 2006	Male	4	970 ～ 1,050 (1,020)	32.3 ～ 35.0 (33.5)	79.8	1.6
	2		Female	5	960 ～ 1,040 (1,000)	32.8 ～ 34.9 (34.0)	81.1	2.0
	3		Female	5	960 ～ 1,060 (1,024)	32.2 ～ 34.7 (33.4)	80.5	2.1
	4		Female	5	970 ～ 1,120 (1,062)	32.3 ～ 34.2 (33.1)	81.3	1.8
	5		Female	5	950 ～ 1,180 (1,076)	31.9 ～ 36.3 (33.6)	80.5	2.0
Greenling *Hexagrammos lagocephalus* (Offshore of Iwanai)	1	December, 2006	Mixed	7	360 ～ 1,060 (653)	25.5 ～ 35.6 (31.0)	81.1	1.2
	2		Mixed	6	560 ～ 840 (713)	26.1 ～ 31.7 (29.9)	80.4	1.3
	3		Mixed	8	420 ～ 820 (574)	25.1 ～ 31.3 (28.8)	79.4	1.5
	4		Female	5	700 ～ 1,280 (1,034)	28.5 ～ 39.2 (35.3)	80.7	1.5
	5		Female	7	400 ～ 640 (540)	25.4 ～ 30.2 (28.2)	77.9	2.4
Chum salmon *Oncorhynchus keta* (Offshore of Kushiro)	1	October～ November, 2006	Male	2	3,770 ～ 4,320 (4,045)	57.2 ～ 57.6 (57.4)	76.3	2.0
	2		Mixed	2	3,760 ～ 4,320 (4,040)	57.1 ～ 57.4 (57.3)	75.4	2.8
	3		Mixed	2	4,120 ～ 4,190 (4,155)	62.0 ～ 62.2 (62.1)	76.2	2.3
	4		Mixed	2	4,190 ～ 4,410 (4,300)	60.7 ～ 62.1 (61.4)	76.8	2.1
	5		Female	2	4,120 ～ 4,410 (4,265)	60.6 ～ 62.3 (61.5)	77.4	1.9
Greenling *Hexagrammos lagocephalus* (Yamada Bay)	1	November, 2006	Uncertain	7	308.0 ～ 630.1 (446.7)	29.2 ～ 33.4 (30.7)	72.9	3.9
	2		Uncertain	8	257.3 ～ 402.6 (341.6)	27.0 ～ 28.8 (27.7)	73.1	3.8
	3		Uncertain	9	305.1 ～ 386.5 (343.3)	26.2 ～ 26.9 (26.6)	72.7	3.6
	4		Uncertain	11	246.1 ～ 317.1 (285.2)	24.5 ～ 25.7 (25.2)	72.9	3.1
	5		Uncertain	14	185.4 ～ 275.4 (238.3)	20.9 ～ 24.5 (23.3)	74.3	2.9
Sea bass *Lateolabrax japonicus* (Matsushima Bay)	1	September, 2006	Uncertain	22	96.8 ～ 281 (181)	19.0 ～ 27.5 (23.4)	72.0	1.5
	2		Uncertain	22	98.1 ～ 318 (158)	18.8 ～ 28.2 (22.5)	73.4	1.5
	3		Uncertain	22	93.2 ～ 243 (135)	18.6 ～ 26.9 (21.3)	70.6	1.1
	4		Uncertain	21	88.8 ～ 288 (158)	19.0 ～ 27.8 (22.3)	71.9	1.3
	5		Uncertain	22	88.8 ～ 301 (157)	18.3 ～ 27.3 (22.6)	72.4	1.5
Pacific saury *Cololabis saira* (Offshore of Joban)	1	October, 2006	Mixed	30	122 ～ 146 (138)	～ 29 (～29)	63.1	14.9
	2		Mixed	30	137 ～ 171 (154)	30 (30)	61.7	17.3
	3		Mixed	30	141 ～ 176 (158)	31 (31)	62.6	15.1
	4		Mixed	25	142 ～ 201 (163)	32 (32)	64.0	14.4
	5		Mixed	40	96 ～ 173 (145)	26 ～ 32 (29)	63.3	14.3
Sea bass *Lateolabrax japonicus* (Tokyo Bay)	1	September, 2006	Mixed	4	1,349 ～ 1,900 (1,533)	44.7 ～ 50.9 (46.7)	75.3	3.3
	2		Mixed	3	1,306 ～ 1,707 (1,494)	44.1 ～ 48.9 (46.2)	73.3	3.1
	3		Mixed	4	817 ～ 1,267 (1,022)	37.8 ～ 43.8 (40.7)	76.1	2.1
	4		Mixed	4	959 ～ 1,159 (1,021)	38.9 ～ 42.8 (40.6)	75.6	2.3
	5		Mixed	4	722 ～ 1,007 (891)	35.5 ～ 42.5 (39.1)	74.8	2.5
Sea bass *Lateolabrax japonicus* (Kawasaki Port)	1	September, 2006	Male	3	1,100 ～ 1,850 (1,400)	42.0 ～ 50.0 (45.3)	76	2.9
	2		Mixed	3	1,200 ～ 1,750 (1,420)	42.0 ～ 49.0 (44.7)	76	2.7
	3		Mixed	3	1,300 ～ 1,500 (1,400)	45.0 (45.0)	78	1.5
	4		Mixed	4	950 ～ 1,100 (1,030)	40.0 ～ 42.0 (41.0)	76	2.9
	5		Mixed	3	1,050 ～ 1,600 (1,350)	42.0 ～ 47.0 (43.7)	77	2.6
Dace *Tribolodon hakonensis* (Lake Biwa, Riv. Azumi)	1	April, 2006	Female	28	118 ～ 487 (211)	22.3 ～ 34.3 (25.9)	75.3	2.9
	2		Male	30	120 ～ 283 (179)	22.9 ～ 28.4 (25.4)	74.7	3.3
	3		Female	20	113 ～ 421 (277)	23.4 ～ 31.9 (28.6)	75.8	3.2
	4		Male	30	113 ～ 266 (158)	22.4 ～ 28.8 (24.5)	75.7	2.6
	5		Female	19	111 ～ 551 (263)	22.1 ～ 33.3 (27.1)	75.5	2.7
Sea bass *Lateolabrax japonicus* (Osaka Bay)	1	August, 2006	Uncertain	8	546 ～ 679 (602)	33.0 ～ 35.0 (34.1)	77.1	2.3
	2		Uncertain	8	614 ～ 828 (692)	34.0 ～ 36.0 (34.7)	76.4	2.9
	3		Uncertain	8	570 ～ 692 (644)	32.0 ～ 35.0 (33.7)	76.6	2.8
	4		Uncertain	8	525 ～ 659 (604)	31.5 ～ 35.5 (33.8)	76.9	2.4
	5		Uncertain	8	454 ～ 615 (540)	31.0 ～ 34.5 (32.6)	76.7	2.6

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, 2006	Female	2	1,100 ～ 2,300 (1,700)	51 ～ 64 (58)	75.4	3.93
	2		Female	1	2,400 (2,400)	66 (66)	72.7	3.50
	3		Female	2	2,000 ～ 2,400 (2,200)	65 ～ 69 (67)	72.6	5.66
	4		Female	2	2,000 ～ 2,500 (2,250)	64 ～ 64 (64)	72.6	4.74
	5		Female	2	1,600 ～ 2,400 (2,000)	59 ～ 68 (63)	76.3	6.31
Sea bass *Lateolabrax japonicus* (Nakaumi)	1	December, 2006	Mixed	12	235 ～ 315 (270)	25.5 ～ 29 (27.2)	80.95	0.94
	2		Mixed	12	265 ～ 310 (287)	27.5 ～ 30.0 (28.0)	82.18	1.20
	3		Mixed	12	260 ～ 320 (285)	26.0 ～ 29.5 (28.1)	82.71	1.38
	4		Mixed	12	270 ～ 405 (331)	28.0 ～ 31.0 (29.4)	81.91	1.51
	5		Mixed	12	310 ～ 555 (418)	30.0 ～ 34.5 (32.2)	82.03	1.9
Sea bass *Lateolabrax japonicus* (Hiroshima Bay)	1	November, 2006	Male	3	1,031 ～ 1,271 (1,129)	41.5 ～ 44.0 (42.8)	77.7	1.4
	2		Male	4	832 ～ 1,016 (919)	39.5 ～ 41.5 (40.1)	77.8	2.2
	3		Male	4	705 ～ 928 (823)	38.0 ～ 39.5 (38.6)	77.9	1.9
	4		Male	4	730 ～ 905 (783)	36.0 ～ 36.5 (36.4)	77.2	2.6
	5		Female	4	847 ～ 1,074 (918)	38.0 ～ 41.0 (39.3)	77.4	2.5
Sea bass *Lateolabrax japonicus* (Mouth of Riv. Shimanto)	1	October, 2006	Mixed	5	510 ～ 660 (576)	32 ～ 34 (33)	77.1	1.4
	2		Mixed	7	421 ～ 457 (440)	28 ～ 30 (29)	78.7	1.2
	3		Mixed	8	386 ～ 415 (403)	27 ～ 30 (29)	78.7	1.2
	4		Mixed	8	371 ～ 392 (382)	26 ～ 29 (28)	78.2	1.2
	5		Female	9	322 ～ 387 (355)	25 ～ 29 (28)	77.4	1.1
Sea bass *Lateolabrax japonicus* (West Coast of Satsuma Peninsula)	1	November, 2006	Mixed	7	384.0 ～ 504.8 (444.2)	29.9 ～ 30.4 (30.1)	76.0	1.21
	2		Mixed	7	420.1 ～ 569.8 (472.4)	30.5 ～ 31.0 (30.7)	77.4	1.29
	3		Mixed	6	402.3 ～ 622.8 (491.0)	31.0 ～ 31.7 (31.4)	77.6	1.19
	4		Mixed	7	436.2 ～ 530.2 (481.2)	31.7 ～ 32.5 (32.1)	77.5	1.29
	5		Mixed	6	460.7 ～ 740.2 (559.7)	32.8 ～ 33.3 (33.1)	76.7	1.61
Okinawa seabeam *Acanthopagrus sivicolus* (Nakagusuku Bay)	1	January～February, 2007	Male	3	810 ～ 1,480 (1,093)	32.5 ～ 33.5 (32.8)	74.7	1.9
	2		Female	3	1,140 ～ 1,270 (1,203)	33 ～ 37.5 (35.3)	73.7	1.3
	3		Female	4	750 ～ 1,040 (832)	29.7 ～ 32 (30.6)	73.3	0.8
	4		Female	4	850 ～ 930 (887)	32 ～ 34 (33.0)	73.4	1.1
	5		Mixed	4	750 ～ 1,035 (878)	28 ～ 34 (31.3)	74.6	1.0

Table 3-2-3 Basic data of specimens (birds as wildlife) in the Environmental Monitoring in FY 2006

Bird species (Area)	No	Sampling month	Sex	Number of animals	Weight (g) (Average)	Length (cm) (Average)	Water content %	Lipid content %
Black-tailed gull *Larus crassirostris* (Kabu Is. (Hachinohe City))	1	July, 2006	Uncertain	39	254 ～ 578 (385)	36 ～ 55 (46)	70.8	4.7
	2		Uncertain	37	274 ～ 571 (410)	33 ～ 51 (42)	72.2	4.4
	3		Uncertain	41	265 ～ 597 (395)	32 ～ 49 (41)	73.4	3.9
	4		Uncertain	50	229 ～ 561 (387)	34 ～ 56 (45)	72.1	4.2
	5		Uncertain	42	297 ～ 539 (415)	32 ～ 60 (41)	71.7	4.4
Gray starling *Sturnus cineraceus* (Suburb of Morioka City)	1	October, 2006	Male	51	66.90 ～ 103.49 (90.20)	11.7 ～ 15.0 (12.8)	70.0	3.2
	2		Female	59	70.03 ～ 104.16 (88.52)	11.4 ～ 13.7 (12.6)	69.5	3.1
	3		Female	60	46.75 ～ 100.95 (88.02)	11.2 ～ 13.7 (12.5)	69.5	3.0
	4		Female	71	69.38 ～ 101.80 (85.90)	11.2 ～ 14.0 (12.5)	70.2	2.9
	5		Mixed	69	72.73 ～ 119.04 (88.91)	10.7 ～ 13.6 (12.6)	69.6	2.8

4. Summary of monitoring results

The detection ranges are shown in Table 3-3-1 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 2006 were tested for its statistically significant difference from the results in each year between FY 2002～2005 (FY 2003～2005 for air) by the following procedures. When a significant difference was identified between the two years, whether the monitoring result in FY 2006 was significantly higher or lower was described.

In the combination of the monitoring results in FY 2006 and those in each previous year,

①Significance tests were not performed when the combination contained the monitoring results where the measured concentrations of more than 50% of samples did not exceed detection limit (nd).

②In cases all monitoring results were found to fit with a normal distribution by Shapiro-Wilk test, parametric approach was employed. When null hypothesis was rejected by ANOVA (analysis of variance), significant differences between average concentrations in FY 2006 and those in past year were identified by Tukey-Kramer HSD (honestly significant difference) test (most typical multiple comparison test where all paired comparisons were tested simultaneously).

③In cases monitoring results were not found to fit with a normal distribution, nonparametric approach was employed. When the null hypothesis "all groups distribute equally" was tested by Kruskal-Wallis test and the results were found significant by repeated Mann-Whitny U-test, significant differences between average concentrations in FY 2006 and those in past year were identified. In such a multiple comparison as repeated U-test, the level of statistical significance was adjusted to secure an overall significant level of 5% by Bonferroni correction. When the combination contained the monitoring result where the sample number was less than 10, nonparametric approach was regarded unsuitable, and further test was not carried out.

Data were carefully handled on the basis of following points.

・In general

The data were described as "nd" in cases where the measured concentrations did not exceed the detection limit (=MDL), whereas the data were described as "tr( )" in cases where the measured concentrations exceeded the detection limit but did not exceed the quantification limit (=MQL). Geometric means were calculated by quantifying "nd" as half the value of the corresponding detection limit.

・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 5, 2006～October 7, 2006) and the second was for that in the cold season (October 30, 2006～December 25, 2006).

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.

Test results of significance tests between the monitoring results in FY 2006 and those in past years.

Target chemicals		Surface water	Sediment	Wildlife			Air		
No	Name			Bivalves	Fish	Birds	Warm season	Cold season	All the values in the cold season versus corresponding values in the warm season in each FY
[1]	Polychlorinated biphenyls (PCBs)	↓	×	×	×	—	×	×	↓
[2]	Hexachlorobenzene	↓	×	×	×	—	↓	↓	↓
[3]	Aldrin	—	—	—	—	—	—	—	—
[4]	Dieldrin	×	×	×	×	—	×	×	↓
[5]	Endrin	×	×	×	×	—	↓	—	↓
[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] Parlar-26	—	—	×	×	—	—	—	—
	[9-2] Parlar-50	—	—	×	×	—	—	—	—
	[9-3] Parlar-62	—	—	—	—	—	—	—	—
[10]	Mirex	—	×	×	×	—	×	↑	×
[11]	HCHs								
	[11-1] α-HCH	×	×	↓	×	—	×	×	↓
	[11-2] β-HCH	×	×	×	×	—	↓	↓	↓
	[11-3] γ-HCH	↓	×	×	×	—	×	×	↓
	[11-4] δ-HCH	×	×	×	×	—	↓	×	↓

↑: the monitoring results in FY 2006 are significantly higher, ↓: the monitoring results in FY 2006 are significantly lower,
×: not significantly different, —: not tested

Table 3-3-1 (1/2) List of the detection ranges in the Environmental Monitoring in FY 2006 (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)	15～4,300 (48/48)	240	36～690,000 (64/64)	7,600
[2]	Hexachlorobenzene	nd～190 (46/48)	16	10～19,000 (64/64)	170
[3]	Aldrin	nd～4.4 (18/48)	nd	nd～330 (64/64)	9.1
[4]	Dieldrin	6～800 (48/48)	36	tr(1.7)～1,500 (64/64)	54
[5]	Endrin	nd～26 (44/48)	3.1	nd～61,000 (63/64)	11
[6]	DDTs	tr(9)～480 (48/48)	63	19～210,000 (64/64)	1,800
	[6-1] *p,p'*-DDT	tr(1.6)～170 (48/48)	9.1	4.5～130,000 (64/64)	260
	[6-2] *p,p'*-DDE	tr(4)～170 (48/48)	24	5.8～49,000 (64/64)	640
	[6-3] *p,p'*-DDD	2.0～99 (48/48)	16	2.2～53,000 (64/64)	490
	[6-4] *o,p'*-DDT	0.51～52 (48/48)	2.8	tr(0.8)～18,000 (64/64)	49
	[6-5] *o,p'*-DDE	nd～210 (28/48)	tr(1.6)	tr(0.4)～27,000 (64/64)	37
	[6-6] *o,p'*-DDD	nd～39 (40/48)	2.5	tr(0.3)～13,000 (64/64)	110
[7]	Chlordanes	tr(15)～1,200 (48/48)	86	9～40,000 (64/64)	340
	[7-1] *cis*-Chlordane	5～440 (48/48)	31	tr(0.9)～13,000 (64/64)	90
	[7-2] *trans*-Chlordane	tr(4)～330 (48/48)	24	2.2～12,000 (64/64)	98
	[7-3] Oxychlordane	nd～18 (43/48)	tr(2.5)	nd～280 (54/64)	tr(2.4)
	[7-4] *cis*-Nonachlor	1.0～83 (48/48)	6.6	tr(0.6)～5,800 (64/64)	52
	[7-5] *trans*-Nonachlor	3.2～310 (48/48)	21	3.4～10,000 (64/64)	91
[8]	Heptachlors	1.5～49 (48/48)	9	nd～260 (57/64)	tr(10)
	[8-1] Heptachlor	nd～6 (5/48)	nd	nd～230 (64/64)	4.6
	[8-2] *cis*-Heptachlor epoxide	1.1～47 (48/48)	7.6	nd～210 (58/64)	3.7
	[8-3] *trans*-Heptachlor epoxide	nd (0/48)	nd	nd～19 (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～0.07 (1/48)	nd	nd～640 (57/64)	1.5
[11]	HCHs				
	[11-1] *α*-HCH	25～2,100 (48/48)	110	tr(2)～4,300 (64/64)	130
	[11-2] *β*-HCH	42～2,000 (48/48)	200	2.3～21,000 (64/64)	180
	[11-3] *γ*-HCH	tr(9)～460 (48/48)	44	tr(1.4)～3,500 (64/64)	45
	[11-4] *δ*-HCH	2.2～1,000 (48/48)	24	nd～6,000 (64/64)	41

(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 2006 (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)	690～77,000 (7/7)	6,400	990～310,000 (16/16)	12,000	5,600～48,000 (2/2)	11,000	21～1,500 (37/37)	170	19～450 (37/37)	82
[2]	Hexachlorobenzene	11～340 (7/7)	35	25～1,400 (16/16)	170	490～2,100 (2/2)	960	23～210 (37/37)	83	8.2～170 (37/37)	65
[3]	Aldrin	nd～19 (3/7)	nd	nd～tr(2) (2/16)	nd	nd (0/2)	nd	nd～8.5 (31/37)	0.30	nd～1.1 (16/37)	tr(0.05)
[4]	Dieldrin	30～47,000 (7/7)	340	19～1,400 (16/16)	220	440～1,300 (2/2)	700	1.5～290 (37/37)	15	0.7～250 (37/37)	4.5
[5]	Endrin	tr(5)～3,100 (7/7)	37	nd～150 (16/16)	13	tr(4)～57 (2/2)	15	nd～5.4 (32/37)	0.31	nd～5.0 (7/37)	nd
[6]	DDTs	530～8,700 (7/7)	1,900	470～40,000 (16/16)	3,400	6,200～160,000 (2/2)	37,000	3.4～100 (37/37)	14	1.8～25 (37/37)	5.3
	[6-1] *p,p'*-DDT	56～1,100 (7/7)	210	tr(5)～3,000 (16/16)	280	110～1,800 (2/2)	420	0.35～51 (37/37)	4.2	0.29～7.3 (37/37)	1.4
	[6-2] *p,p'*-DDE	160～6,000 (7/7)	910	280～28,000 (16/16)	2,100	5,900～160,000 (2/2)	35,000	1.7～49 (37/37)	5.0	0.52～9.5 (37/37)	1.9
	[6-3] *p,p'*-DDD	7.3～1,400 (7/7)	240	60～4,300 (16/16)	500	55～1,800 (2/2)	370	nd～1.3 (36/37)	0.28	nd～0.99 (36/37)	0.14
	[6-4] *o,p'*-DDT	24～380 (7/7)	76	6～700 (16/16)	91	3～120 (2/2)	10	0.55～20 (37/37)	2.5	0.37～3.9 (37/37)	0.90
	[6-5] *o,p'*-DDE	12～340 (7/7)	56	tr(1)～4,800 (16/16)	50	tr(1)～3 (2/2)	tr(2)	nd～7.4 (36/37)	1.1	0.19～2.6 (37/37)	0.65
	[6-6] *o,p'*-DDD	7～1,000 (7/7)	120	tr(1)～1,100 (16/16)	76	5～19 (2/2)	8	tr(0.05)～1.4 (37/37)	0.28	nd～0.79 (34/37)	0.12
[7]	Chlordanes	240～23,000 (7/7)	2,300	290～16,000 (16/16)	2,100	960～2,700 (2/2)	1,400	10～2,900 (37/37)	260	5.7～910 (37/37)	61
	[7-1] *cis*-Chlordane	67～18,000 (7/7)	810	56～4,900 (16/16)	490	5～250 (2/2)	32	2.9～760 (37/37)	82	2.0～280 (37/37)	19
	[7-2] *trans*-Chlordane	41～2,800 (7/7)	370	14～2,000 (16/16)	150	tr(3)～17 (2/2)	7	3.4～1,200 (37/37)	96	2.0～350 (37/37)	22
	[7-3] Oxychlordane	7～2,400 (7/7)	77	28～3,000 (16/16)	140	270～720 (2/2)	500	0.47～5.7 (37/37)	1.8	tr(0.13)～5.1 (37/37)	0.54
	[7-4] *cis*-Nonachlor	31～1,500 (7/7)	210	33～3,300 (16/16)	360	60～270 (2/2)	120	0.28～170 (37/37)	11	tr(0.14)～41 (37/37)	2.4
	[7-5] *trans*-Nonachlor	85～3,200 (7/7)	530	120～6,900 (16/16)	910	310～1,500 (2/2)	630	3.0～800 (37/37)	68	1.4～240 (37/37)	16
[8]	Heptachlors	tr(12)～1,100 (7/7)	57	tr(8)～270 (16/16)	46	240～650 (2/2)	320	1.1～160 (37/37)	22	0.7～58 (37/37)	8.0
	[8-1] Heptachlor	nd～20 (6/7)	tr(3)	nd～8 (8/16)	tr(2)	nd (0/2)	nd	0.88～160 (37/37)	20	0.32～56 (37/37)	6.8
	[8-2] *cis*-Heptachlorepoxide	8～1,100 (7/7)	44	4～270 (16/16)	40	240～650 (2/2)	320	0.13～6.7 (37/37)	1.7	nd～3.2 (36/37)	0.74
	[8-3] *trans*-Heptachlorepoxide	nd～45 (1/7)	nd	nd (0/16)	nd	nd (0/2)	nd	nd～0.7 (2/37)	nd	nd～tr(0.1) (1/37)	nd
[9]	Toxaphenes										
	[9-1] Parlar-26	nd～25 (5/7)	tr(9)	nd～880 (15/16)	37	nd～750 (1/2)	48	nd (0/37)	nd	nd (0/37)	nd
	[9-2] Parlar-50	nd～32 (6/7)	tr(11)	nd～1,300 (16/16)	49	nd～1,000 (1/2)	46	nd (0/37)	nd	nd (0/37)	nd
	[9-3] Parlar-62	nd (0/7)	nd	nd～870 (10/16)	tr(30)	nd～430 (1/2)	70	nd (0/37)	nd	nd (0/37)	nd
[10]	Mirex	tr(2)～19 (7/7)	5	tr(2)～53 (16/16)	10	39～280 (2/2)	72	nd～0.22 (29/37)	tr(0.07)	nd～2.1 (27/37)	tr(0.07)
[11]	HCHs										
	[11-1] α-HCH	6～390 (7/7)	21	tr(2)～360 (16/16)	42	55～100 (2/2)	75	21～1,400 (37/37)	98	7.6～630 (37/37)	41
	[11-2] β-HCH	11～880 (7/7)	59	4～1,100 (16/16)	85	1,100～4,200 (2/2)	2,100	0.66～26 (37/37)	4.5	tr(0.12)～17 (37/37)	0.98
	[11-3] γ-HCH	7～140 (7/7)	14	tr(2)～97 (16/16)	18	8～29 (2/2)	16	4.4～540 (37/37)	28	2.5～270 (37/37)	12
	[11-4] δ-HCH	tr(1)～890 (7/7)	3	nd～35 (16/16)	4	9～21 (2/2)	13	tr(0.12)～17 (37/37)	2.0	tr(0.13)～14 (37/37)	0.80

(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 3-3-2 List of the quantification [detection] limits in the Environmental Monitoring in FY 2005 (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)	※9 ※[3]	※4 ※[1]	※42 ※[14]	※0.8 ※[0.3]
[2]	Hexachlorobenzene	16 [5]	2.9 [1.0]	3 [1]	0.21 [0.07]
[3]	Aldrin	1.7 [0.6]	1.9 [0.6]	4 [2]	0.14 [0.05]
[4]	Dieldrin	3 [1]	2.9 [1.0]	7 [3]	0.3 [0.1]
[5]	Endrin	1.3 [0.4]	4 [1]	11 [4]	0.30 [0.10]
[6]	DDTs	※16 ※[5]	※6 ※[2]	※20 ※[7]	※0.7 ※[0.2]
	[6-1] *p,p'*-DDT	1.9 [0.6]	1.4 [0.5]	6 [2]	0.17 [0.06]
	[6-2] *p,p'*-DDE	7 [2]	1.0 [0.3]	1.9 [0.7]	0.10 [0.03]
	[6-3] *p,p'*-DDD	1.6 [0.5]	0.7 [0.2]	2.4 [0.9]	0.13 [0.04]
	[6-4] *o,p'*-DDT	2.3 [0.8]	1.2 [0.4]	3 [1]	0.09 [0.03]
	[6-5] *o,p'*-DDE	2.6 [0.9]	1.1 [0.4]	3 [1]	0.09 [0.03]
	[6-6] *o,p'*-DDD	0.8 [0.3]	0.5 [0.2]	4 [1]	0.10 [0.03]
[7]	Chlordanes	※19 ※[6]	※9 ※[3]	※21 ※[8]	※0.8 ※[0.3]
	[7-1] *cis*-Chlordane	5 [2]	2.4 [0.8]	4 [1]	0.13 [0.04]
	[7-2] *trans*-Chlordane	7 [2]	1.1 [0.4]	4 [2]	0.17 [0.06]
	[7-3] Oxychlordane	2.8 [0.9]	2.9 [1.0]	7 [3]	0.23 [0.08]
	[7-4] *cis*-Nonachlor	0.8 [0.3]	1.2 [0.4]	3 [1]	0.15 [0.05]
	[7-5] *trans*-Nonachlor	3.0 [1.0]	1.2 [0.4]	3 [1]	0.10 [0.03]
[8]	Heptachlors	※9 ※[3]	※12 ※[4]	※23 ※[8]	※0.5 ※[0.2]
	[8-1] Heptachlor	5 [2]	1.9 [0.6]	6 [2]	0.11 [0.04]
	[8-2] *cis*-Heptachlor epoxide	2.0 [0.7]	3.0 [1.0]	4 [1]	0.11 [0.04]
	[8-3] *trans*-Heptachlor epoxide	1.8 [0.6]	7 [2]	13 [5]	0.3 [0.1]
[9]	Toxaphenes				
	[9-1] Parlar-26	16 [5]	12 [4]	18 [7]	1.8 [0.6]
	[9-2] Parlar-50	16 [5]	24 [7]	14 [5]	1.6 [0.5]
	[9-3] Parlar-62	60 [20]	210 [60]	70 [30]	8 [3]
[10]	Mirex	1.6 [0.5]	0.6 [0.2]	3 [1]	0.13 [0.04]
[11]	HCHs				
	[11-1] *α*-HCH	3 [1]	5 [2]	3 [1]	0.08 [0.03]
	[11-2] *β*-HCH	1.7 [0.6]	1.3 [0.4]	3 [1]	0.17 [0.06]
	[11-3] *γ*-HCH	18 [6]	2.1 [0.7]	4 [2]	0.08 [0.03]
	[11-4] *δ*-HCH	2.0 [0.8]	1.7 [0.6]	3 [1]	0.14 [0.05]

(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 (Cl_1～Cl_{10}).
(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 List of the detection ranges in the Environmental Monitoring in FY 2006 (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)			
				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]	2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym: Atrazine)			nd (0/7)	nd	nd (0/16)	nd	nd (0/2)	nd				
[13]	2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym: Kelthane or Dicofol)			nd～0.24 (5/7)	tr(0.064)	nd～0.29 (1/16)	nd	nd (0/2)	nd				
[14]	2,4,6-Tri-*tert*-butylphenol			nd (0/7)	nd	nd～tr(4.7) (1/16)	nd	nd (0/2)	nd	nd～13 (1/37)	nd	nd (0/37)	nd
[15]	Di-*n*-butyl phthalate			nd～tr(35) (3/7)	nd	nd～990 (15/16)	tr(20)	nd～tr(35) (1/2)	nd				
[16]	Polychlorinated naphthalenes			tr(0.019)～1.2 (7/7)	0.085	nd～2.7 (16/16)	0.068	tr(0.011)～0.027 (2/2)	tr(0.017)				
[17]	Dioctyltin compounds			nd～tr(0.34) (1/7)	nd	nd～4.7 (3/16)	nd	nd (0/2)	nd				
[18]	Tri-*n*-butyl phosphate			nd (0/7)	nd	nd (0/16)	nd	nd (0/2)	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 2006 (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]	2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym: Atrazine)			0.98 [0.38]	
[13]	2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym: Kelthane or Dicofol)			0.092 [0.036]	
[14]	2,4,6-Tri-*tert*-butylphenol			5.7 [2.2]	0.71 [0.28]
[15]	Di-*n*-butyl phthalate			38 [15]	
[16]	Polychlorinated naphthalenes			※0.027 ※[0.011]	
[17]	Dioctyltin compounds			0.70 [0.27]	
[18]	Tri-*n*-butyl phosphate			1.0 [0.4]	

(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 (Cl_1～Cl_8).
(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.

(1) The Environmental Monitoring (POPs and HCHs)

The high-sensitivity analysis of POPs and HCHs was conducted in FY 2006, following the monitoring in FY 2002, 2003, 2004 and 2005. Except for cases of undetected *trans*-heptachlor epoxide and toxaphenes in surface water, toxaphenes in sediment, toxaphenes (Parlar-62) in wildlife (bivalves), *trans*-heptachlor epoxide in wildlife (fish), aldrin, heptachlors, and *trans*-heptachlor epoxide in wildlife (birds), and toxaphenes 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 ※3 pg/L, and the detection range was 15～4,800 pg/L. The detected concentrations in FY 2006 were significantly lower than those in FY 2003, 2004 and 2005.

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 pg/g-dry, and the detection range was 36～690,000 pg/g-dry.

○ Stocktaking of the detection of PCBs (total amount) in suraface water and sediment during FY 2002～2006

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
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

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

The presence of the substances in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of ※14 pg/g-wet, and the detection range was 690～77,000 pg/g-wet. For fish, the substances were monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of ※14 pg/g-wet, and the detection range was 990～310,000 pg/g-wet. For birds, the substances were monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of ※14 pg/g-wet, and the detection range was 5,600～48,000 pg/g-wet. From the beginning of the monitoring, a trend of long-term decrease was observed in bivalves and fish, respectively.

○ Stocktaking of the detection of PCBs (total amount) in wildlife (bivalves, fish and birds) during FY 2002～2006

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
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
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

(Note) ※ indicates the sum value of the Quantification [Detection] limits of each congener, and therefore the detention range that did not exceed this value can be shown instead of "nd".

The presence of the substances in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of ※0.3 pg/m^3, and the detection range was 21～1,500 pg/m^3. For air in the cold season, the substance were monitored at 37 sites, and it was detected at all 37 valid areas adopting the detection limit of ※0.3 pg/m^3, and the detection range was 19～450 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

○ Stocktaking of the detection of PCBs (total amount) in air during FY 2002～2006

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
	2003 Warm season	260	340	2,600	36	※6.6 [2.2]	35/35	35/35
	2003 Cold season	110	120	630	17		34/34	34/34
	2004 Warm season	240	250	3,300	25	※2.9 [0.98]	37/37	37/37
	2004 Cold season	130	130	1,500	20		37/37	37/37
	2005 Warm season	190	210	1,500	23	※0.38 [0.14]	37/37	37/37
	2005 Cold season	66	64	380	20		37/37	37/37
	2006 Warm season	170	180	1,500	21	※0.8 [0.3]	37/37	37/37
	2006 Cold season	82	90	450	19		37/37	37/37

(Note) ※ indicates the sum value of the Quantification [Detection] limits of each congener, and therefore the detention range that did not exceed this value can be shown instead of "nd".

[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 46 of the 48 valid sites adopting the detection limit of 5 pg/L, and none of the detected concentrations exceeded 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 1.0 pg/g-dry, and the detection range was 10～19,000 pg/g-dry.

○ Stocktaking of the detection of hexachlorobenzene in suraface water and sediment during FY 2002～2006

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
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

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 11～340 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 25～1,400 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 490～2,100 pg/g-wet. From the beginning of the monitoring, a trend of long-term decrease was observed in fish.

○ Stocktaking of the detection of hexachlorobenzene in wildlife (bivalves, fish and birds) during FY 2002～2006

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
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
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

The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.07 pg/m^3, and the detection range was 23～210 pg/m^3. The detected concentrations in FY 2006 were significantly lower than those in FY 2004 and 2005. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.07 pg/m^3, and the detection range was 8.2～170 pg/m^3. The detected concentrations in FY 2005 and 2006 were significantly lower than those in FY 2003 and 2004. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

○ Stocktaking of the detection of hexachlorobenzene in air during FY 2002～2006

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
	2003 Warm season	150	130	430	81	2.3 [0.78]	35/35	35/35
	2003 Cold season	94	90	320	64		34/34	34/34
	2004 Warm season	130	130	430	47	1.1 [0.37]	37/37	37/37
	2004 Cold season	98	89	390	51		37/37	37/37
	2005 Warm season	88	90	250	27	0.14 [0.034]	37/37	37/37
	2005 Cold season	77	68	180	44		37/37	37/37
	2006 Warm season	83	89	210	23	0.21 [0.07]	37/37	37/37
	2006 Cold season	65	74	170	8.2		37/37	37/37

[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 17 of the 47valid sites adopting the detection limit of 0.6 pg/L, and none of the detected concentrations exceeded 4.4 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 330 pg/g-dry.

○ Stocktaking of the detection of aldrin in suraface water and sediment during FY 2002～2006

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
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

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 3 of the 7 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded 19 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 1.2 pg/g-wet.

○ Stocktaking of the detection of aldrin in wildlife (bivalves, fish and birds) during FY 2002～2006

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
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
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

The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at 31 of the 37 valid sites adopting the detection limit of 0.05 pg/m^3, and none of the detected concentrations exceeded 8.5 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at 16 of the 37 valid sites adopting the detection limit of 0.05 pg/m^3, and none of the detected concentrations exceeded 1.1 pg/m^3.

○ Stocktaking of the detection of aldrin in air during FY 2002～2006

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
	2003 Warm season	1.5	1.9	28	nd	0.023 [0.0077]	34/35	34/35
	2003 Cold season	0.55	0.44	6.9	0.030		34/34	34/34
	2004 Warm season	tr(0.12)	nd	14	nd	0.15 [0.05]	15/37	15/37
	2004 Cold season	tr(0.08)	nd	13	nd		14/37	14/37
	2005 Warm season	0.33	0.56	10	nd	0.08 [0.03]	29/37	29/37
	2005 Cold season	tr(0.04)	nd	1.8	nd		9/37	9/37
	2006 Warm season	0.30	0.35	8.5	nd	0.14 [0.05]	31/37	31/37
	2006 Cold season	tr(0.05)	nd	1.1	nd		16/37	16/37

There still remains of technical problems such as low recovery ratios in the measurement of aldrin in sediment and air.

[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 1 pg/L, and the detection range was 6～800 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 1.0 pg/g-dry, and the detection range was tr(1.7)～1,500 pg/g-dry.

○ Stocktaking of the detection of dieldrin in suraface water and sediment during FY 2002～2006

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
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

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 30～47,000 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 19～1,400 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 400～1,300 pg/g-wet. From the beginning of the monitoring, a trend of long-term decrease was observed in bivalves and fish, respectively.

○ Stocktaking of the detection of dieldrin in wildlife (bivalves, fish and birds) during FY 2002～2006

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
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
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

The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.1 pg/m^3, and the detection range was 1.5～290 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.1 pg/m^3, and the detection range was 0.7～250 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

○ Stocktaking of the detection of dieldrin in air during FY 2002～2006

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

[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 44 of the 48 valid sites adopting the detection limit of 26 pg/L, and none of the detected concentrations exceeded 26 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 1 pg/g-dry, and none of the detected concentrations exceeded 61,000 pg/g-dry.

○ Stocktaking of the detection of endrin in suraface water and sediment during FY 2002～2006

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
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

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 4 pg/g-wet, and the detection range was tr(5)～3,100 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 4 pg/g-wet, and none of the detected concentrations exceeded 150 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 4 pg/g-wet, and the detection range was tr(4)～57 pg/g-wet.

○ Stocktaking of the detection of endrin in wildlife (bivalves, fish and birds) during FY 2002～2006

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
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
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

The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at 32 of the 37 valid sites adopting the detection limit of 0.10 pg/m^3, and none of the detected concentrations exceeded 5.4 pg/m^3. The detected concentrations in FY 2006 were significantly lower than those in FY 2003 and 2004. For air in the cold season, the substance was monitored at 37 sites, and it was detected at 7 of the 37 valid sites adopting the detection limit of 0.10 pg/m^3, and none of the detected concentrations exceeded 5.0 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003〜2006.

○ Stocktaking of the detection of endrin in air during FY 2002〜2006

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
	2003 Warm season	0.74	0.95	6.2	0.081	0.042 [0.014]	35/35	35/35
	2003 Cold season	0.23	0.20	2.1	0.042		34/34	34/34
	2004 Warm season	0.64	0.68	6.5	tr(0.054)	0.14 [0.048]	37/37	37/37
	2004 Cold season	0.23	0.26	1.9	nd		36/37	36/37
	2005 Warm season	tr(0.4)	tr(0.3)	2.9	nd	0.5 [0.2]	27/37	27/37
	2005 Cold season	nd	nd	0.7	nd		8/37	8/37
	2006 Warm season	0.31	0.32	5.4	nd	0.30 [0.10]	32/37	32/37
	2006 Cold season	nd	nd	5.0	nd		7/37	7/37

[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 all 48 valid sites adopting the detection limit of 0.6 pg/L, and the detection range was tr(1.6)～170 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 4.5～130,000 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(4)～170 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 5.8～49,000 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 0.5 pg/L, and the detection range was 2.0～99 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 0.2 pg/g-dry, and the detection range was 2.2～53,000 pg/g-dry.

○ Stocktaking of the detection of *p,p'*-DDT, *p,p'*-DDE and *p,p'*-DDD in suraface water and sediment during FY 2002～2006

p,p'-DDT	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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

p,p'-DDE	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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

p,p'-DDD	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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

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 56～1,100 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was tr(5)～3,000 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 110～1,800 pg/g-wet. From the beginning of the monitoring, a trend of long-term decrease was observed in bivalves and fish, respectively.

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 0.7 pg/g-wet, and the detection range was 160～6,000 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 0.7 pg/g-wet, and the detection range was 280～28,000 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 0.7 pg/g-wet, and the detection range was 5,900～160,000 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 0.9 pg/g-wet, and the detection range was 7.3～1,400 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 0.9 pg/g-wet, and the detection range was 60～4,300 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 0.9 pg/g-wet, and the detection range was 55～1,800 pg/g-wet. From the beginning of the monitoring, a trend of long-term decrease was observed in fish.

○ Stocktaking of the detection of *p,p'*-DDT, *p,p'*-DDE and *p,p'*-DDD in wildlife (bivalves, fish and birds) during FY 2002～2006

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
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
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

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
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
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

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
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
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

p,p'-DDT: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.06 pg/m^3, and the detection range was 0.35～51 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.06 pg/m^3, and the detection range was 0.29～7.3 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

p,p'-DDE: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 1.7～49 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 0.52～9.5 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

p,p'-DDD: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.04 pg/m^3, and none of the detected concentrations exceeded 1.3 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at 36 of the 37 valid sites adopting the detection limit of 0.04 pg/m^3, and none of the detected concentrations exceeded 0.99 pg/m^3. The detected concentrations in FY 2006 were significantly lower than those in FY 2005, but were almost same levels as those in FY 2003 and 2004. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

○ Stocktaking of the detection of *p,p'*-DDT, *p,p'*-DDE and *p,p'*-DDD in air during FY 2002～2006

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
	2003 Warm season	5.8	6.6	24	0.75	0.14 [0.046]	35/35	35/35
	2003 Cold season	1.7	1.6	11	0.31		34/34	34/34
	2004 Warm season	4.7	5.1	37	0.41	0.22 [0.074]	37/37	37/37
	2004 Cold season	1.8	1.7	13	0.29		37/37	37/37
	2005 Warm season	4.1	4.2	31	0.44	0.16 [0.054]	37/37	37/37
	2005 Cold season	1.1	0.99	4.8	0.25		37/37	37/37
	2006 Warm season	4.2	3.8	51	0.35	0.17 [0.06]	37/37	37/37
	2006 Cold season	1.4	1.2	7.3	0.29		37/37	37/37
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
	2003 Warm season	7.2	7.0	51	1.2	0.40 [0.13]	35/35	35/35
	2003 Cold season	2.8	2.4	22	1.1		34/34	34/34
	2004 Warm season	6.1	6.3	95	0.62	0.12 [0.039]	37/37	37/37
	2004 Cold season	2.9	2.6	43	0.85		37/37	37/37
	2005 Warm season	5.0	5.7	42	1.2	0.14 [0.034]	37/37	37/37
	2005 Cold season	1.7	1.5	9.9	0.76		37/37	37/37
	2006 Warm season	5.0	4.7	49	1.7	0.10 [0.03]	37/37	37/37
	2006 Cold season	1.9	1.7	9.5	0.52		37/37	37/37
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
	2003 Warm season	0.30	0.35	1.4	0.063	0.054 [0.018]	35/35	35/35
	2003 Cold season	0.13	0.14	0.52	tr(0.037)		34/34	34/34
	2004 Warm season	0.24	0.27	1.4	tr(0.036)	0.053 [0.018]	37/37	37/37
	2004 Cold season	0.12	0.12	0.91	tr(0.025)		37/37	37/37
	2005 Warm season	0.24	0.26	1.3	tr(0.07)	0.16 [0.05]	37/37	37/37
	2005 Cold season	tr(0.06)	tr(0.07)	0.29	nd		28/37	28/37
	2006 Warm season	0.28	0.32	1.3	nd	0.13 [0.04]	36/37	36/37
	2006 Cold season	0.14	tr(0.12)	0.99	nd		36/37	36/37

- 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 all 48 valid sites adopting the detection limit of 0.8 pg/L, and the detection range was tr(0.8)～52 pg/L. The detected concentrations in FY 2006 were significantly lower than those in FY 2002 and 2003.

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(0.8)～18,000 pg/g-dry.

o,p'-DDE: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 27 of the 47 valid sites adopting the detection limit of 0.9 pg/L, and none of the detected concentrations exceeded 210 pg/L. It was also detected at 1 valid site adopting the detection limit of 0.04 pg/L, and all the detected concentration was 0.52 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(0.4)～27,000 pg/g-dry.

o,p'-DDD: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 40 of the 48 valid sites adopting the detection limit of 0.3 pg/L, and none of the detected concentrations exceeded 39 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 0.2 pg/g-dry, and the detection range was tr(0.3)～13,000 pg/g-dry.

○ Stocktaking of the detection of *o,p'*-DDT, *o,p'*-DDE and *o,p'*-DDD in suraface water and sediment during FY 2002～2006

o,p'-DDT	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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
o,p'-DDE	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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
o,p'-DDD	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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

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 24～380 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 6～700 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 3～120 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 1 pg/g-wet, and the detection range was 12～340 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)～4,800 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was tr(1)～3 pg/g-wet.

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 7～1,000 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 tr(1)～1,100 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 5～19 pg/g-wet.

○ Stocktaking of the detection of *o,p'*-DDT, *o,p'*-DDE and *o,p'*-DDD in wildlife (bivalves, fish and birds) during FY 2002～2006

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
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
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
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
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
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
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
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
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

o,p'-DDT: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 0.55～20 pg/m^3. The detected concentrations in FY 2006 and FY 2005 were significantly lower than those in FY 2003 and 2004. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 0.37～3.9 pg/m^3. The detected concentrations in FY 2006 and 2005 were significantly lower than those in FY 2003 and

2004. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

o,p'-DDE: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at 36 of the 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detected concentrations did not exceed 7.4 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 0.19～2.6 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

o,p'-DDD: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was tr(0.05)～1.4 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at 34 of 37 valid sites adopting the detection limit of 0.03 pg/m^3, and none of the detected concentrations exceeded 0.79 pg/m^3. The detected concentrations in FY 2006 were significantly higher than those in FY 2005, but were almost same levels as those in FY 2003 and 2004. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

○ Stocktaking of the detection of *o,p'*-DDT, *o,p'*-DDE and *o,p'*-DDD in air during FY 2002～2006

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
	2003 Warm season	6.9	7.7	38	0.61	0.12 [0.040]	35/35	35/35
	2003 Cold season	1.6	1.4	6.4	0.43		34/34	34/34
	2004 Warm season	5.1	5.4	22	0.54	0.093 [0.031]	37/37	37/37
	2004 Cold season	1.5	1.4	9.4	0.35		37/37	37/37
	2005 Warm season	3.0	3.1	14	0.67	0.10 [0.034]	37/37	37/37
	2005 Cold season	0.76	0.67	3.0	0.32		37/37	37/37
	2006 Warm season	2.5	2.4	20	0.55	0.09 [0.03]	37/37	37/37
	2006 Cold season	0.90	0.79	3.9	0.37		37/37	37/37

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
	2003 Warm season	1.4	1.5	7.5	0.17	0.020 [0.0068]	35/35	35/35
	2003 Cold season	0.50	0.47	1.7	0.18		34/34	34/34
	2004 Warm season	1.1	1.2	8.9	0.14	0.037 [0.012]	37/37	37/37
	2004 Cold season	0.53	0.49	3.9	0.14		37/37	37/37
	2005 Warm season	1.6	1.5	7.9	0.33	0.074 [0.024]	37/37	37/37
	2005 Cold season	0.62	0.59	2.0	0.24		37/37	37/37
	2006 Warm season	1.1	1.1	7.4	nd	0.09 [0.03]	36/37	36/37
	2006 Cold season	0.65	0.56	2.6	0.19		37/37	37/37

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
	2003 Warm season	0.37	0.42	1.3	0.059	0.042 [0.014]	35/35	35/35
	2003 Cold season	0.15	0.14	0.42	0.062		34/34	34/34
	2004 Warm season	0.31	0.33	2.6	tr(0.052)	0.14 [0.048]	37/37	37/37
	2004 Cold season	0.14	tr(0.13)	0.86	nd		35/37	35/37
	2005 Warm season	0.22	0.19	0.90	tr(0.07)	0.10 [0.03]	37/37	37/37
	2005 Cold season	tr(0.07)	tr(0.07)	0.21	nd		35/37	35/37
	2006 Warm season	0.28	0.28	1.4	tr(0.05)	0.10 [0.03]	37/37	37/37
	2006 Cold season	0.12	0.11	0.79	nd		34/37	34/37

[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-Precision 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 all 48 valid sites adopting the detection limit of 2 pg/L, and the detection range was 5～440 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 0.8 pg/g-dry, and the detection range was tr(0.9)～13,000 pg/g-dry. The detected concentrations in FY 2006 were significantly lower than those in FY 2003.

trans-Chlordane: 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(4)～330 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 2.2～12,000 pg/g-dry.

○ Stocktaking of the detection of *cis*-chlordane and *trans*-chlordane in suraface water and sediment during FY 2002～2006

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	1900	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
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

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
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

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 1 pg/g-wet, and the detection range was 67～18,000 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 56～4,900 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 5～250 pg/g-wet. From the beginning of the monitoring, a trend of long-term decrease was observed in bivalves and fish, respectively.

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 41～2,800 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 14～2,000 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was tr(3)～17 pg/g-wet. From the beginning of the monitoring, a trend of long-term decrease was observed in bivalves and fish, respectively.

○ Stocktaking of the detection of *cis*-chlordane and *trans*-chlordane in wildlife (bivalves, fish and birds) during FY 2002～2006

cis-Chlordane	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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
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

trans-Chlordane	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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
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

cis-Chlordane: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.04 pg/m^3, and the detection range was 2.9～760 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.04 pg/m^3, and the detection range was 2.0～280 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

trans-Chlordane: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.06 pg/m^3, and the detection range was 3.4～1,200 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.06 pg/m^3, and the detection range was 2.0～350 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

○ Stocktaking of the detection of *cis*-chlordane and *trans*-chlordane in air during FY 2002～2006

cis-Chlordane	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Air (pg/m^3)	2002	31	40	670	0.86	0.60 [0.20]	102/102	34/34
	2003 Warm season	110	120	1,600	6.4	0.51 [0.17]	35/35	35/35
	2003 Cold season	30	38	220	2.5		34/34	34/34
	2004 Warm season	92	160	1,000	2.3	0.57 [0.19]	37/37	37/37
	2004 Cold season	29	49	290	1.2		37/37	37/37
	2005 Warm season	92	120	1,000	3.4	0.16 [0.054]	37/37	37/37
	2005 Cold season	16	19	260	1.4		37/37	37/37
	2006 Warm season	82	110	760	2.9	0.13 [0.04]	37/37	37/37
	2006 Cold season	19	19	280	2.0		37/37	37/37
trans-Chlordane	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Air (pg/m^3)	2002	36	48	820	0.62	0.60 [0.20]	102/102	34/34
	2003 Warm season	130	150	2,000	6.5	0.86 [0.29]	35/35	35/35
	2003 Cold season	37	44	290	2.5		34/34	34/34
	2004 Warm season	110	190	1,300	2.2	0.69 [0.23]	37/37	37/37
	2004 Cold season	35	60	360	1.5		37/37	37/37
	2005 Warm season	100	130	1,300	3.2	0.34 [0.14]	37/37	37/37
	2005 Cold season	19	23	310	1.9		37/37	37/37
	2006 Warm season	96	140	1,200	3.4	0.17 [0.06]	37/37	37/37
	2006 Cold season	22	21	350	2.0		37/37	37/37

- 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 42 of the 47 valid sites adopting the detection limit of 0.9 pg/L, and none of the detected concentrations exceeded 18 pg/L. It was also detected at 1 valid site adopting the detection limit of 0.04 pg/L, and all the detected concentration was 0.38 pg/L.

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 54 of the 64 valid sites adopting the detection limit of 1.0 pg/g-dry, and none of the detected concentrations exceeded 280 pg/g-dry.

cis-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 0.3 pg/L, and the detection range was 1.0～83 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(0.6)～5,800 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 1.0 pg/L, and the detection range was 3.2～310 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 3.4～10,000 pg/g-dry.

○ Stocktaking of the detection of oxychlordane, *cis*-nonachlor and *trans*-nonachlor in suraface water and sediment during FY 2002～2006

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
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

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
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

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
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

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 3 pg/g-wet, and the detection range was 7～2,400 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 28～3,000 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 270～720 pg/g-wet.

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 33～3,300 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 60～270 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 60～270 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 1 pg/g-wet, and the detection range was 85～3,200 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 the detection range was 120～6,900 pg/g-wet. For birds, the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 310～1,500 pg/g-wet.

From the beginning of the monitoring of each of those three substances, a trend of long-term decrease was observed in fish.

○ Stocktaking of the detection of oxychlordane, *cis*-nonachlor and *trans*-nonachlor in wildlife (bivalves, fish and birds) during FY 2002～2006

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
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
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
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
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
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
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
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
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

Oxychlordane: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.08 pg/m^3, and the detection range was 0.47～5.7 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.05 pg/m^3, and the detection range was tr(0.14)～41 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

cis-Nonachlor: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all

37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 3.0～800 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 1.4～240 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

trans-Nonachlor: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 3.0～800 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 1.4～240 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

○ Stocktaking of the detection of oxychlordane, *cis*-nonachlor and *trans*-nonachlor in air during FY 2002～2006

Oxychlordane	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Air (pg/m^3)	2002	0.96	0.98	8.3	nd	0.024 [0.008]	101/102	34/34
	2003 Warm season	2.5	2.7	12	0.41	0.045 [0.015]	35/35	35/35
	2003 Cold season	0.87	0.88	3.2	0.41		34/34	34/34
	2004 Warm season	1.9	2.0	7.8	0.41	0.13 [0.042]	37/37	37/37
	2004 Cold season	0.80	0.76	3.9	0.27		37/37	37/37
	2005 Warm season	1.9	2.0	8.8	0.65	0.16 [0.054]	37/37	37/37
	2005 Cold season	0.55	0.50	2.2	0.27		37/37	37/37
	2006 Warm season	1.8	1.9	5.7	0.47	0.23 [0.08]	37/37	37/37
	2006 Cold season	0.54	0.56	5.1	tr(0.13)		37/37	37/37

cis-Nonachlor	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Air (pg/m^3)	2002	3.1	4.0	62	0.071	0.030 [0.010]	102/102	34/34
	2003 Warm season	12	15	220	0.81	0.026 [0.0088]	35/35	35/35
	2003 Cold season	2.7	3.5	23	0.18		34/34	34/34
	2004 Warm season	10	15	130	0.36	0.072 [0.024]	37/37	37/37
	2004 Cold season	2.7	4.4	28	0.087		37/37	37/37
	2005 Warm season	10	14	160	0.30	0.08 [0.03]	37/37	37/37
	2005 Cold season	1.6	1.6	34	0.08		37/37	37/37
	2006 Warm season	11	12	170	0.28	0.15 [0.05]	37/37	37/37
	2006 Cold season	2.4	2.0	41	tr(0.14)		37/37	37/37

trans-Nonachlor	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Air (pg/m^3)	2002	24	30	550	0.64	0.30 [0.10]	102/102	34/34
	2003 Warm season	87	100	1,200	5.1	0.35 [0.12]	35/35	35/35
	2003 Cold season	24	28	180	2.1		34/34	34/34
	2004 Warm season	72	120	870	1.9	0.48 [0.16]	37/37	37/37
	2004 Cold season	23	39	240	0.95		37/37	37/37
	2005 Warm season	75	95	870	3.1	0.13 [0.044]	37/37	37/37
	2005 Cold season	13	16	210	1.2		37/37	37/37
	2006 Warm season	68	91	800	3.0	0.10 [0.03]	37/37	37/37
	2006 Cold season	16	15	240	1.4		37/37	37/37

[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,sdiment 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 4 of the 47 valid sites adopting the detection limit of 2 pg/L, and none of the detected concentrations exceeded 6 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 230 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 0.7 pg/L, and the detection range was 1.1～47 pg/L.

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 64 of the 58 valid sites adopting the detection limit of 1.0 pg/g-dry, and none of the detected concentrations exceeded 210 pg/g-dry.

trans-Heptachlor epoxide: The presence of the substance in surface water was monitored at 48 sites, and it was not detected at all 47 valid sites adopting the detection limit of 0.6 pg/L, and it was not detected at 1 site adopting the detection limit of 0.02 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 2 pg/g-dry, and none of the detected concentrations exceeded 19 pg/g-dry.

○ Stocktaking of the detection of heptachlor, *cis*-heptachlor epoxide, and *trans*-heptachlor epoxide in surface water and sediment during FY 2002～2006

Heptachlor	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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
cis-Heptachlor epoxide	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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
trans-Heptachlor epoxide	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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

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 20 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in 8 of the 16 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded 8 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 4～270 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 240～650 pg/g-wet.

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 45 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) and air during FY 2002～2006

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
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
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
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
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
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
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
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
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

Heptachlor: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.04 pg/m^3, and the detection range was 0.88～160 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.04 pg/m^3, and the detection range was 0.32～56 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

cis-Heptachlor epoxide: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.04 pg/m^3, and the detection range was 0.88～160 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.04 pg/m^3, and the detection range was 0.32～56 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

trans-Heptachlor epoxide: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at 2 of the 37 valid sites adopting the detection limit of 0.1 pg/m^3, and none of the detected concentrations exceeded 0.7 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at 1 of the 37 valid sites adopting the detection limit of 0.1 pg/m^3, and none of the detected concentrations exceeded tr(0.1) pg/m^3.

○ Stocktaking of the detection of heptachlor, *cis*-heptachlor epoxide, and *trans*-heptachlor epoxide in air during FY 2003～2006

Heptachlor	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Air (pg/m^3)	2002	11	14	220	0.20	0.12 [0.04]	102/102	34/34
	2003 Warm season	27	41	240	1.1	0.25 [0.085]	35/35	35/35
	2003 Cold season	10	16	65	0.39		34/34	34/34
	2004 Warm season	23	36	200	0.46	0.23 [0.078]	37/37	37/37
	2004 Cold season	11	18	100	0.53		37/37	37/37
	2005 Warm season	25	29	190	1.1	0.16 [0.054]	37/37	37/37
	2005 Cold season	6.5	7.9	61	0.52		37/37	37/37
	2006 Warm season	20	27	160	0.88	0.11 [0.04]	37/37	37/37
	2006 Cold season	6.8	7.2	56	0.32		37/37	37/37
cis-Heptachlor epoxide	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Air (pg/m^3)	2003 Warm season	3.5	3.5	28	0.45	0.015 [0.0048]	35/35	35/35
	2003 Cold season	1.3	1.3	6.6	0.49		34/34	34/34
	2004 Warm season	2.8	2.9	9.7	0.65	0.052 [0.017]	37/37	37/37
	2004 Cold season	1.1	1.1	7.0	0.44		37/37	37/37
	2005 Warm season	1.5	1.7	11	tr(0.10)	0.12 [0.044]	37/37	37/37
	2005 Cold season	0.91	0.81	2.9	0.43		37/37	37/37
	2006 Warm season	1.7	2.0	6.7	0.13	0.11 [0.04]	37/37	37/37
	2006 Cold season	0.74	0.88	3.2	nd		36/37	36/37
trans-Heptachlor epoxide	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Air (pg/m^3)	2003 Warm season	tr(0.036)	tr(0.038)	0.30	nd	0.099 [0.033]	18/35	18/35
	2003 Cold season	nd	nd	tr(0.094)	nd		3/34	3/34
	2004 Warm season	nd	nd	tr(0.38)	nd	0.6 [0.2]	4/37	4/37
	2004 Cold season	nd	nd	nd	nd		0/37	0/37
	2005 Warm season	tr(0.10)	tr(0.12)	1.2	nd	0.16 [0.05]	27/37	27/37
	2005 Cold season	nd	nd	0.32	nd		3/37	3/37
	2006 Warm season	nd	nd	0.7	nd	0.3 [0.1]	2/37	2/37
	2006 Cold season	nd	nd	tr(0.1)	nd		1/37	1/37

[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: The presence of the substance in surface water was monitored at 48 sites, and it was not detected at all 47 valid sites adopting the detection limit of 5 pg/L. It was neither detected at 1 site adopting the detection limit of 0.2 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 4 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 47 valid sites adopting the detection limit of 5 pg/L. It was neither detected at 1 site adopting the detection limit of 0.2 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 7 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 47 valid sites adopting the detection limit of 20 pg/L. It was neither detected at 1 site adopting the detection limit of 0.8 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 60 pg/g-dry.

○ Stocktaking of the detection of parlar-26, parlar-50 and parlar-62 in surface water and sediment during FY 2003～2006

Parlar-26	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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
Parlar-50	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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
Parlar-62	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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

Parlar-26: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 5 of the 7 valid areas adopting the detection limit of 25 pg/g-wet, and none of the detected concentrations exceeded 880 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 7 pg/g-wet, and none of the detected concentrations exceeded 880 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 7 pg/g-wet, and none of the detected concentrations exceeded 750 pg/g-wet. The substance was detected in all samples in 1 area of Kabu Is. (black-tailed Gull), while it was detected in none of samples in 1 area of a suburb of Morioka (gray starling).

Parlar-50: 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 32 pg/g-wet, and none of the detected concentrations exceeded 32 pg/g-wet. For fish, the substance was monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 5 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 1 of the 2 valid areas adopting the detection limit of 5 pg/g-wet, and none of the detected concentrations exceeded 1,000 pg/g-wet. The substance was detected in all samples in 1 area of Kabu Is. (black-tailed Gull), while it was detected in none of samples in 1 area of a suburb of Morioka (gray starling).

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 10 of the 16 valid areas adopting the detection limit of 30 pg/g-wet, and none of the detected concentrations exceeded 870 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 430 pg/g-wet. The substance was detected in all samples in 1 area of Kabu Is. (black-tailed Gull), while it was detected in none of samples in 1 area of a suburb of Morioka (gray starling).

○ Stocktaking of detection of parlar-26, parlar-50 and parlar-62 in wildlife (bivalves, fish, birds) in FY 2003～2006

Parlar-26	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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
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
Parlar-50	**Monitored year (FY)**	**Geometric mean**	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**Detection frequency Sample**	**Detection frequency 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
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
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
Parlar-62	**Monitored year (FY)**	**Geometric mean**	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**Detection frequency Sample**	**Detection frequency 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
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
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

Parlar-26: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected in none of 37 valid sites adopting the detection limit of 0.6 pg/m^3.

Parlar-50: The presence of the substance in air in the warm season was monitored at 37 sites, and it was not detected at all 37 valid sites adopting the detection limit of 0.5 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was not detected at all 37 valid sites adopting the detection limit of 0.5 pg/m^3.

Parlar-62: The presence of the substance in air in the warm season was monitored at 37 sites, and it was not detected at all 37 valid sites adopting the detection limit of 3 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was not detected at all 37 valid sites adopting the detection limit of 3 pg/m^3.

○ Stocktaking of the detection of parlar-26, parlar-50 and parlar-62 in air during FY 2003～2006

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

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

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

[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 not detected at the 47 valid sites adopting the detection limit of 0.5 pg/L. It was detected at 1 site adopting the detection limit of 0.02 pg/L, and none of the detected concentrations exceeded 0.07 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 0.2 pg/g-dry, and none of the detected concentrations exceeded 640 pg/g-dry.

○ Stocktaking of the detection of mirex in surface water and sediment during FY 2003～2006

Mirex	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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

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)～19 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(2)～53 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 39～280 pg/g-wet.

○ Stocktaking of the detection of mirex in wildlife (bivalves, fish and birds) during FY 2003～2006

Mirex	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
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
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
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

The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at 29 of the 37 valid sites adopting the detection limit of 0.04 pg/m^3, and none of the detected concentrations exceeded 2.1 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at 27 of the 37 valid sites adopting the detection limit of 0.04 pg/m^3, and none of the detected concentrations exceeded 2.1 pg/m^3. The detected concentrations in FY 2006 were significantly higher than those in FY 2005, but were almost same levels as those in the warm season. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2005.

○ Stocktaking of the detection of mirex in air during FY 2003～2006

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

[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: 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 1 pg/L, and the detection range was 25～2,100 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 the detection range was tr(2)～4,300 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 0.6 pg/L, and the detection range was 42～2,000 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 2.3～21,000 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 6 pg/L, and the detection range was tr(9)～460 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 0.7 pg/g-dry, and the detection range was tr(1.4)～3,500 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 0.8 pg/L, and the detection range was 2.2～1,000 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 6,000 pg/g-dry.

○ Stocktaking of the detection of α-HCH, *β*-HCH、γ-HCH and δ-HCH in suraface water and sediment during FY 2002～2006

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
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

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
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

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
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

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
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

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 1 pg/g-wet, and the detection range was 6～390 pg/g-wet. The detected concentrations in FY 2006 and 2005 were significantly higher than those in FY 2004. 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(2)～360 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 55～100 pg/g-wet. From the beginning of the monitoring, a trend of long-term decrease was observed in bivalves and fish, respectively.

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 1 pg/g-wet, and the detection range was 11～880 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 4～1,100 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 1,100～4,200 pg/g-wet. From the beginning of the monitoring, a trend of long-term decrease was observed in bivalves and fish, respectively.

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 2 pg/g-wet, and the detection range was 7～140 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 8～29 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 8～29 pg/g-wet. From the beginning of the monitoring, a trend of long-term decrease was observed in fish.

δ-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 1 pg/g-wet, and the detection range was tr(1)～890 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 35pg/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 9～21 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 2002～2006

α-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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
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
β-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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
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
γ-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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
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
δ-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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
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
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

α-HCH: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 21～1,400 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 7.6～630 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

β-HCH: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.06 pg/m^3, and the detection range was 0.66～26 pg/m^3. The detected concentrations in FY 2006 and 2005 were significantly lower than those in FY 2003. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.06 pg/m^3, and the detection range was tr(0.12)～17 pg/m^3. The detected concentrations in FY 2006 and 2005 were significantly lower than those in FY 2003 and 2004. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

γ-HCH: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 4.4～540 pg/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 2.5～270 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

δ-HCH: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.05 pg/m^3, and the detection range was tr(0.12)～17 pg/m^3. The detected concentrations in FY 2006, 2005, and 2004 were lower than those in FY 2003. For air in the cold season, the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.05 pg/m^3, and the detection range was tr(0.13)～14 pg/m^3. All the values in the warm season were higher than the corresponding values in the cold season during FY 2003～2006.

○ Stocktaking of the detection of α-HCH, β-HCH, γ-HCH and δ-HCH in air during FY 2003～2006

α-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Air (pg/m^3)	2003 Warm season	210	120	5,000	38	0.71 [0.24]	35/35	35/35
	2003 Cold season	49	35	1,400	9.9		34/34	34/34
	2004 Warm season	160	130	3,200	24	0.33 [0.11]	37/37	37/37
	2004 Cold season	68	52	680	11		37/37	37/37
	2005 Warm season	110	78	2,000	22	0.074 [0.024]	37/37	37/37
	2005 Cold season	35	22	630	9.6		37/37	37/37
	2006 Warm season	98	74	1,400	21	0.08 [0.03]	37/37	37/37
	2006 Cold season	41	26	630	7.6		37/37	37/37

β-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Air (pg/m^3)	2003 Warm season	9.6	11	97	1.1	0.19 [0.063]	35/35	35/35
	2003 Cold season	2.1	1.6	57	0.52		34/34	34/34
	2004 Warm season	6.6	7.7	110	0.53	0.12 [0.041]	37/37	37/37
	2004 Cold season	2.6	2.6	78	0.32		37/37	37/37
	2005 Warm season	4.9	5.7	52	0.67	0.12 [0.044]	37/37	37/37
	2005 Cold season	1.1	1.1	16	0.24		37/37	37/37
	2006 Warm season	4.5	4.9	26	0.66	0.17 [0.06]	37/37	37/37
	2006 Cold season	0.98	0.99	17	tr(0.12)		37/37	37/37

γ-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Air (pg/m^3)	2003 Warm season	63	44	2,200	8.8	0.57 [0.19]	35/35	35/35
	2003 Cold season	14	12	330	3.1		34/34	34/34
	2004 Warm season	46	43	860	4.5	0.23 [0.076]	37/37	37/37
	2004 Cold season	19	16	230	2.6		37/37	37/37
	2005 Warm season	34	24	650	5.9	0.13 [0.044]	37/37	37/37
	2005 Cold season	9.3	6.6	110	2.1		37/37	37/37
	2006 Warm season	28	23	540	4.4	0.08 [0.03]	37/37	37/37
	2006 Cold season	12	11	270	2.5		37/37	37/37

δ-HCH	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Air (pg/m^3)	2003 Warm season	5.1	4.2	120	0.48	0.03 [0.01]	35/35	35/35
	2003 Cold season	0.97	0.76	47	0.11		34/34	34/34
	2004 Warm season	2.2	2.5	93	0.15	0.15 [0.05]	37/37	37/37
	2004 Cold season	0.76	0.77	18	tr(0.07)		37/37	37/37
	2005 Warm season	1.7	1.7	35	0.29	0.13 [0.04]	37/37	37/37
	2005 Cold season	0.38	0.41	11	nd		36/37	36/37
	2006 Warm season	2.0	2.0	17	tr(0.12)	0.14 [0.05]	37/37	37/37
	2006 Cold season	0.80	0.62	14	tr(0.13)		37/37	37/37

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

Except for undetected cases of 2-chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym: atrazine) and tri-*n*-butyl phosphate in wildlife, all chemicals were detected.

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

[12] 2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym: Atrazine)

- History and state of monitoring

The substance is used as herbicides, etc. The substance was detected neither in surface water nor in sediment in FY 1991 in "the Environmental Survey of Chemicals [v)]".

- Monitoring results

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 0.38 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 0.38 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 0.38 ng/g-wet.

○ Stocktaking of detection of 2-chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym: atrazine) in wildlife (bivalves, fish and birds) in FY 2006

2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym: Atrazine)	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (ng/g-wet)	2006	nd	nd	nd	nd	0.98 [0.38]	0/31	0/7
Fish (ng/g-wet)	2006	nd	nd	nd	nd	0.98 [0.38]	0/80	0/16
Birds (ng/g-wet)	2006	nd	nd	nd	nd	0.98 [0.38]	0/10	0/2

[13] 2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym: Kelthane or Dicofol)

- History and state of monitoring

This substance is used as miticides, etc. The substance is designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law and a Class I Designated Substance under the PRTR Law. This substance was surveyed in surface water and sediment in FY 1978. Although no domestic record of manufacture/import of the substance was now reported, monitoring the environmental existence of this highly accumulative substance is considered important.

- Monitoring results

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 5 of the 7 valid areas adopting the detection limit of 0.036 ng/g-wet, and the detection concentrations did not exceed 0.24 ng/g-wet. For fish, the substance was monitored in 16 areas and detected in 1 of 16 valid areas adopting the detection limit of 0.036 ng/g-wet, and none of the detected concentrations exceeded 0.29 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 0.036 ng/g-wet.

○ Stocktaking of detection of 2,2,2-trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym: Kelthane or Dicofol) in wildlife in FY 2006

2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym: Kelthane or Dicofol)	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (ng/g-wet)	2006	tr(0.064)	tr(0.070)	0.24	nd	0.092 [0.036]	22/31	5/7
Fish (ng/g-wet)	2006	nd	nd	0.29	nd	0.092 [0.036]	5/80	1/16
Birds (ng/g-wet)	2006	nd	nd	nd	nd	0.092 [0.036]	0/10	0/2

[14] 2,4,6-Tri-*tert*-butylphenol

- History and state of monitoring

This substance is used as an antioxidant for rubber/plastic products etc.. It was designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in December 2000. The substance was detected neither in wildlife (fish) in FY 2002 nor in air in FY 2003 in "the Environmental Survey of Chemicals [v)]".

- Monitoring results

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 2.2 ng/g-wet. For fish, the substance was monitored in 16 areas and detected in 1 of the 16 valid areas adopting the detection limit of 2.2 ng/g-wet, and none of the detected concentrations exceeded tr(4.7) 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 2.2 ng/g-wet.

○ Stocktaking of detection of 2,4,6-tri-*tert*-butylphenol in wildlife (bivalves, fish and birds) in FY 2006

2,4,6-Tri-*tert*-butylphenol	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (ng/g-wet)	2006	nd	nd	nd	nd	5.7 [2.2]	0/31	0/7
Fish (ng/g-wet)	2006	nd	nd	tr(4.7)	nd	5.7 [2.2]	3/80	1/16
Birds (ng/g-wet)	2006	nd	nd	nd	nd	5.7 [2.2]	0/10	0/2

The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.28 ng/m^3, and none of the detected concentrations exceeded 13 ng/m^3. For air in the cold season, the substance was monitored at 37 sites, and it was not detected at all 37 valid sites adopting the detection limit of 0.28 ng/m^3.

○ Stocktaking of detection of 2,4,6-tri-*tert*-butylphenol in air in FY 2006

2,4,6-Tri-*tert*-butylphenol	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (ng/m^3)	2006 Warm season	nd	nd	13	nd	0.71 [0.28]	3/111	1/37
	2006 Cold season	nd	nd	nd	nd		0/111	0/37

[15] Di-*n*-butyl phthalate

- History and state of monitoring

The substance is used as plastisizers in plastic products. The substance was detected in wildlife (fish) in FY 1974 and 1996 in “the Environmental Survey of Chemicals[v)]”, and also detected in bivalves in FY 1989, 1991, 1993 and 1995 in “the Wildlife Monitoring.”

- Monitoring results

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 3 of 7 valid areas adopting the detection limit of 15 ng/g-wet, none of the detected concentrations exceeded tr(35) ng/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 15 ng/g-wet, and none of the detected concentrations exceeded 990 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 15 ng/g-wet, and none of the detected concentrations exceeded tr(35) ng/g-wet.

○ Stocktaking of detection of di-*n*-butyl phthalate in wildlife (bivalves, fish and birds) in FY 2006

Di-*n*-butyl phthalate	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (ng/g-wet)	2006	nd	nd	tr(35)	nd	38 [15]	5/31	3/7
Fish (ng/g-wet)	2006	tr(20)	tr(16)	990	nd	38 [15]	45/80	15/16
Birds (ng/g-wet)	2006	nd	nd	tr(35)	nd	38 [15]	1/10	1/2

Stocktaking of detection of di-*n*-butyl phthalate (ng/g-wet)

Local communities	Monitored areas	Wildlife species	1980	1981	1982	1983	1984	1985	1987	1989	1991	1993	1995	1999	2006
		Detection limit (ng/g-wet)	100	100～1,000	100～500	100	100	100	100	100	100	100	100	100	15
		(Bivalves)													
Iwate Pref.	Yamada Bay	Blue mussel	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Kanagawa Pref.	Miura Peninsula	Blue mussel	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Yokohama City	Yokohama Port	Blue mussel													nd
Ishikawa Pref.	Coast of Noto Peninsula	Blue mussel		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aichi Pref.	Ise Bay	Blue mussel								1/1 300	2/5 nd～200	3/5 100～300	2/5 nd～100	nd	
Shimane Pref.	Shitirui Bay	Blue mussel									nd	nd	nd	nd	1/5 nd～tr(35)
Tokushima Pref.	Naruto	Hard-shelled mussel	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	3/5 nd～tr(24)
Kagawa Pref.	Takamatsu Port	Hard-shelled mussel													1/5 nd～tr(25)
Kitakyushu City	Dokai Bay	Blue mussel													nd
		(Fish)													
Hokkaido	Offshore of Nemuro	Angry rockfish	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd		
	Offshore of Kushiro	Rock greenling													5/5 tr(23)～43
		Angry rockfish												nd	
		Salmon	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	4/5 nd～71
	Offshore of Iwanai	Greenling													1/5 nd～tr(25)
Iwate Pref.	Yamada Bay	Greenling	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	1/5 nd～tr(16)
Miyagi Pref.	Matsushima Bay	Sea bass													2/5 nd～42
Yamagata Pref.	Northeast Coast of Japan Sea	Pacific cod	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Ibaraki Pref.	Offshore of Joban	Pacific saury	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	4/5 nd～67
Tokyo Met.	Tokyo Bay	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	4/5 nd～tr(35)
		Marbled flounder	nd												
Kawasaki City	Offshore of Ogishima Island in Port of Kawasaki	Sea bass													5/5 tr(35)～72
Shiga Pref.	Lake Biwa, Riv. Azumi (Takashima City)	Dace	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	2/5 nd～tr(27)
Osaka Pref.	Osaka Bay	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	5/5 tr(36)～100
Hyogo Pref.	Offshore of Himeji	Sea bass													5/5 290～990
Tottori Pref.	Nakaumi	Sea bass			nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	3/5 nd～tr(17)
Hiroshima City	Hiroshima Bay	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd		nd	nd	nd	2/5 nd～tr(17)
Kochi Pref.	Mouth of Riv. Shimanto (Shimanto City)	Sea bass					nd	nd	nd	nd	nd	nd	nd	nd	1/5 nd～tr(29)
Nagasaki Pref.	Shugen Is.	Sea bass									nd	nd	nd	nd	
Kagoshima Pref.	West Coast of Satsuma Peninsula	Sea bass					nd	nd	nd	nd	nd	nd	nd	nd	1/5 nd～tr(17)
Okinawa Pref.	Nakagusuku Bay	Okinawa seabeam							nd	nd	nd	nd	nd	nd	0/5
		(Birds)													
Aomori Pref.	Kabu Is. (Hachinohe City)	Black-tailed gull											nd	nd	1/5 nd～tr(35)
Iwate Pref.	Suburb of Morioka City	Gray starling		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tokyo Met.	Tokyo Bay	Black-tailed gull			nd	nd	nd	nd	nd	nd	nd	nd			

[16] Polychlorinated naphthalenes

- History and state of monitoring

The substances (having 3 or more chlorines in a molecule) were designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in August 1979. The substances were detected in wildlife (fish) in FY 1976, 1978 and 2002 in "the Environmental Survey of Chemicals [v)]".

- Monitoring results

The presence of the substances in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 0.011 ng/g-wet, and the detection range was tr(0.019)～1.2 ng/g-wet. For fish, the substances were monitored in 16 areas and detected in all 16 valid areas adopting the detection limit of 0.011 ng/g-wet, and none of the detected concentrations exceeded 2.7ng/g-wet. For birds, the substances were monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 0.011 ng/g-wet, and the detection range was tr(0.011)～0.027 ng/g-wet.

○ Stocktaking of detection of Polychlorinated naphthalenesin wildlife (bivalves, fish and birds) in FY 2006

Polychlorinated naphthalenes	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (ng/g-wet)	2006	0.085	0.073	1.2	tr(0.019)	※0.027 [0.011]	31/31	7/7
Fish (ng/g-wet)	2006	0.068	0.049	2.7	nd	※0.027 [0.011]	78/80	16/16
Birds (ng/g-wet)	2006	tr(0.017)	tr(0.018)	0.027	tr(0.011)	※0.027 [0.011]	10/10	2/2

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

[17] Dioctyltin compounds

- History and state of monitoring

The substance is used as stabilizers of polyvinyl chloride and industrial catalysts, etc. The substances were not detected in wildlife (fish) in FY 2000 in “the Environmental Survey of Chemicals [v)]”. Under the framework of the Environmental Monitoring, the substance in wildlife (bivalves, fish and birds) was monitored in FY 2004.

- Monitoring results

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 0.27 ng/g-wet, and none of the detected concentrations exceeded tr(0.34) ng/g-wet. For fish, the substance was monitored in 16 areas and detected in 3 of the 16 valid areas adopting the detection limit of 0.27 ng/g-wet, and none of the detected concentrations exceeded 4.7 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 0.27 ng/g-wet.

○ Stocktaking of detection of Dioctyltin compounds in wildlife (bivalves, fish and birds) in FY 2006

Dioctyltin compounds	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves	2004	nd	nd	nd	nd	3 [1]	0/31	0/7
(ng/g-wet)	2006	nd	nd	tr(0.34)	nd	0.70 [0.27]	3/31	1/7
Fish	2004	nd	nd	tr(2.5)	nd	3 [1]	4/70	1/14
(ng/g-wet)	2006	nd	nd	4.7	nd	0.70 [0.27]	7/80	3/16
Birds	2004	nd	nd	nd	nd	3 [1]	0/10	0/2
(ng/g-wet)	2006	nd	nd	nd	nd	0.70 [0.27]	0/10	0/2

[18] Tri-*n*-butyl phosphate

- History and state of monitoring

The substance is used as plastisizers in plastic products. The substance was detected in wildlife (fish) in FY 1977 and 1993 in “the Environmental Survey of Chemicals[v)]”, and was also detected in bivalves (in FY 1981, 1989, 1995, and 1999), fish (in FY 1981, 1982, 1985, 1989, 1991, and 1999), and birds (in FY 1981, 1982, and 1983) in “the Wildlife Monitoring.”

- Monitoring results

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 0.4 ng/g-wet. For fish, the substance was monitored in 16 areas, and detected in none of 16 valid areas adopting the detection limit of 0.4 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 0.4 ng/g-wet.

○ Stocktaking of detection of Tri-*n*-butyl phosphate in wildlife (bivalves, fish and birds) in FY 2006

Tri-*n*-butyl phosphate	Monitored year (FY)	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Area
Bivalves (ng/g-wet)	2006	nd	nd	nd	nd	1.0 [0.4]	0/31	0/7
Fish (ng/g-wet)	2006	nd	nd	nd	nd	1.0 [0.4]	0/80	0/16
Birds (ng/g-wet)	2006	nd	nd	nd	nd	1.0 [0.4]	0/10	0/2

Stocktaking of detection of tri-*n*-butyl phosphate (ng/g-wet)

Local communities	Monitored areas	Wildlife species	1980	1981	1982	1983	1984	1985	1987	1989	1991	1995	1999	2006
		Detection limit (ng/g-wet)	10	10～50	10	10	10	10	10	10	10	10	10	0.4
		(Bivalves)												
Iwate Pref.	Yamada Bay	Blue mussel	nd	5/5 10～20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Kanagawa Pref.	Miura Peninsula	Blue mussel	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Yokohama City	Yokohama Port	Blue mussel												nd
Ishikawa Pref.	Coast of Noto Peninsula	Blue mussel		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aichi Pref.	Ise Bay	Blue mussel								1/1 10	nd	1/5 nd～10	5/5 20	
Shimane Pref.	Shitirui Bay	Blue mussel									nd	nd	nd	nd
Tokushima Pref.	Naruto	Hard-shelled mussel	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Kagawa Pref.	Takamatsu Port	Hard-shelled mussel												nd
Kitakyushu City	Dokai Bay	Blue mussel												nd
		(Fish)												
Hokkaido	Offshore of Nemuro	Angry rockfish	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd		
	Offshore of Kushiro	Rock greenling												nd
		Angry rockfish											nd	
		Salmon	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Offshore of Iwanai	Greenling												nd
Iwate Pref.	Yamada Bay	Greenling	nd	5/5 20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Miyagi Pref.	Matsushima Bay	Sea bass												nd
Yamagata Pref.	Northeast Coast of Japan Sea	Pacific cod	nd	nd	nd	nd	nd	nd	nd	1/5 nd～20	1/5 nd～20	nd	nd	
Ibaraki Pref.	Offshore of Joban	Pacific saury	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tokyo Met.	Tokyo Bay	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Marbled flounder	nd											
Kawasaki City	Offshore of Ogishima Island in Port of Kawasaki	Sea bass												nd
Shiga Pref.	Lake Biwa, Riv. Azumi (Takashima City)	Dace	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Osaka Pref.	Osaka Bay	Sea bass	nd	nd	nd	nd	nd	5/5 10～20	nd	nd	nd	nd	nd	nd
Hyogo Pref.	Offshore of Himeji	Sea bass												nd
Tottori Pref.	Nakaumi	Sea bass			nd	nd	nd	nd	nd	nd	nd	nd	4/5 10	nd
Hiroshima City	Hiroshima Bay	Sea bass	nd	nd	2/5 nd～20	nd	nd	nd	nd	nd		nd	nd	nd
Kochi Pref.	Mouth of Riv. Shimanto (Shimanto City)	Sea bass					nd	nd	nd	nd	nd	nd	nd	nd
Nagasaki Pref.	Shugen Is.	Sea bass									nd	nd	nd	
Kagoshima Pref.	West Coast of Satsuma Peninsula	Sea bass					nd	nd	nd	nd	nd	nd	nd	nd
Okinawa Pref.	Nakagusuku Bay	Okinawa seabeam							nd	nd	nd	nd	nd	nd
		(Birds)												
Aomori Pref.	Kabu Is. (Hachinohe City)	Black-tailed gull										nd	nd	nd
Iwate Pref.	Suburb of Morioka City	Gray starling		7/7 10～120	3/5 nd～30	5/5 30～250	nd	nd	nd	nd	nd	nd	nd	nd
Tokyo Met.	Tokyo Bay	Black-tailed gull			nd	nd	nd	nd	nd	nd	nd			