Chapter 3 Results of the Environmental Monitoring in FY 2010

1. Purpose of the monitoring

Environmental Monitoring provides annual surveys of the environmental persistence of target chemicals as listed in the Stockholm Convention, chemicals that while undesignated are still subject to review for potential risk, and/or highly persistent chemicals annotated as Specified Chemical Substances and Monitored Chemical Substances under the Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances (aka, the Chemical Substances Control Law), all target chemicals whose year to year changes in persistence in the environment must be understood.

*POPs: persistent organic pollutants

2. Target chemicals

In the FY 2010 Environmental Monitoring, usual 11 chemicals (groups) which added Hexachlorohexanes*, Chlordecone, Hexabromobiphenyls, Polybromodiphenyl ethers (Br_4～Br_{10}) **, Perfluorooctane sulfonic acid (PFOS) and Pentachlorobenzene which were adopted to be POPs in the Stockholm Convention at fourth meeting of the Conference of the Parties held from 4 to 8 May 2009, to initial 5 chemicals*** (groups), namely, Polychlorinated biphenyls (PCBs), Hexachlorobenzene, DDTs, Chlordanes and Heptachlors included in the Stockholm Convention (hereafter, POPs), and 4 chemicals (groups), namely, Perfluorooctanoic acid (PFOA), *N*,*N'*-Diphenyl-p-phenylenediamines, Tributyltin compounds and Triphenyltin compounds were designated as target chemicals. The combinations of target chemicals and the monitoring media are given below.

* In the COP4, *α*-HCH, *β*-HCH and *γ*-HCH (synonym:Lindane) were adopted to be POPs among HCHs, but in this Environmental Monitoring, HCHs which were able to include *δ*-HCH were designated as target chemicals.

** In the COP4, Tetrabromodiphenyl ethers, Pentabromodiphenyl ethers, Hexabromodiphenyl ethers and Heptabromodiphenyl ethers were adopted to be POPs among Polybromodiphenyl ethers but in this Environmental Monitoring, Polybromodiphenyl ethers(Br_4 ～ Br_{10}) which were able to include Octabromodiphenyl ethers Nonabromodiphenyl ethers and Decabromodiphenyl ether were designated as target chemicals.

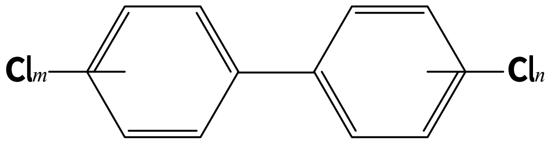
*** Up to FY 2009, the ten target substance groups of pollutants annotated in the Stockholm Convention text with the exceptions of Polybrominated dibenzo-p-dioxin (PCDDs) and Polybrominated dibenzofurans (PCDFs) were monitored each fiscal year. As of FY 2010, the scope of monitoring had been reviewed and adjustments made to implementation frequency; as some target substances were re-designated for bi-annual monitoring, the scope did not include five substances (groups): Aldrin, Dieldrin, Endrin, Toxaphene, and Mirex. In this vein, the FY 2009 findings for these five target substances not specifically monitored in FY 2010 have been included in this report for purpose of reference.

No	Name	Monitored media			
		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 (reference)				
[4]	Dieldrin (reference)				
[5]	Endrin (reference)				
[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 (reference) [9-1] 2-endo,3-exo,5-endo,6-exo,8,8,10,10-octachlorobornane (Parlar-26) (reference) [9-2] 2-endo,3-exo,5-endo,6-exo,8,8,9,10,10-nonachlorobornane (Parlar-50) (reference) [9-3] 2,2,5,5,8,9,9,10,10-Nonachlorobornane (Parlar-62) (reference)				
[10]	Mirex (reference)				
[11]	HCHs (Hexachlorohexanes) [11-1] α-HCH [11-2] β-HCH [11-3] γ-HCH (synonym:Lindane) [11-4] δ-HCH	○	○	○	○
[12]	Chlordecone	○	○	○	○

No	Name	Monitored media			
		Surface water	Sediment	Wildlife	Air
[13]	Hexabromobiphenyls [13-1] 2,2',4,4',5,5'-Hexabromobiphenyl (#153) [13-2] 2,2',4,4',5,6'-Hexabromobiphenyl (#154) [13-3] 2,2',4,4',6,6'-Hexabromobiphenyl (#155) [13-4] 2,3,3',4,4',5 -Hexabromobiphenyl (#156) [13-5] 3,3',4,4',5,5'-Hexabromobiphenyl (#169)	○	○	○	○
[14]	Polybromodiphenyl ethers(Br_4～Br_{10}) [14-1] Tetrabromodiphenyl ethers [14-1-1] 2,2',4,4'-Tetrabromodiphenyl ether (#47) [14-2] Pentabromodiphenyl ethers [14-2-1] 2,2',4,4',5-Pentabromodiphenyl ether (#99) [14-3] Hexabromodiphenyl ethers [14-3-1] 2,2',4,4',5,5'-Pentabromodiphenyl ether (#153) [14-3-2] 2,2',4,4',5,6'-Pentabromodiphenyl ether (#154) [14-4] Heptabromodiphenyl ethers [14-4-1] 2,2',3,3',4,5',6'-Pentabromodiphenyl ether (#175) [14-4-2] 2,2',3,4,4',5',6'-Pentabromodiphenyl ether (#183) [14-5] Octabromodiphenyl ethers [14-6] Nonabromodiphenyl ethers [14-7] Decabromodiphenyl ether	○	○	○	○
[15]	Perfluorooctane sulfonic acid (PFOS)	○	○	○	○
[16]	Perfluorooctanoic acid (PFOA)	○	○	○	○
[17]	Pentachlorobenzene	○	○	○	○
[18]	*N*,*N'*-Diphenyl-*p*-phenylenediamines [18-1] *N*,*N'*-Diphenyl-p-phenylenediamine [18-2] *N*,*N'*-Ditolyl-p-phenylenediamine [18-3] *N*,*N'*-Dixylyl-p-phenylenediamine				○
[19]	Tributyltin compounds	○	○	○	
[20]	Triphenyltin compounds	○	○	○	

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

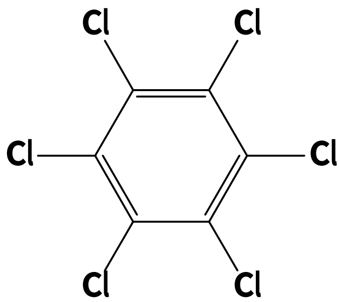
[1] Polychlorinated biphenyls (PCBs)



i = m+n =1～10

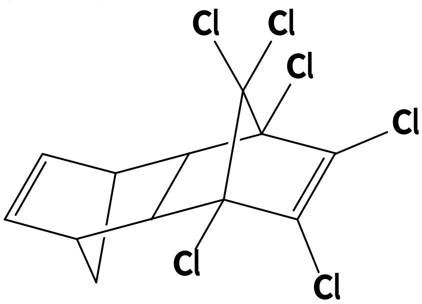
Molecular formula:	$C_{12}H_{(10-i)}Cl_i$(i = m+n =1～10)
CAS:	27323-18-8 (Cl_1), 22512-42-9 (Cl_2), 25323-68-6 (Cl_3), 26914-33-0 (Cl_4), 25429-29-2 (Cl_5), 26601-64-9 (Cl_6), 28655-71-2 (Cl_7), 31472-83-0 (Cl_8), 53742-07-7 (Cl_9), 5051-24-3 (Cl_{10})
ENCS:	No pertinence
MW:	188.65～498.66
mp:	Not specified
bp:	Not specified
SW:	Not specified
Specific gravity:	Not specified
logPow:	Not specified

[2] HCB (Hexachlorobenzene)



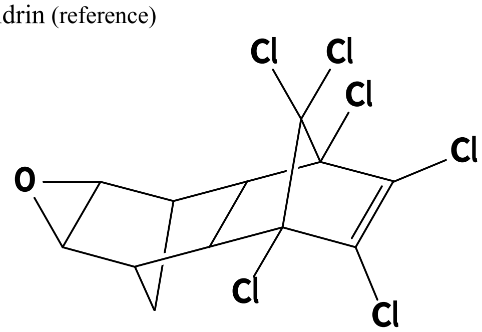
Molecular formula:	C_6Cl_6
CAS:	118-74-1
ENCS:	3-0076
MW:	284.78
mp:	231.8°C [1)]
bp:	323～326°C [1)]
SW:	0.0000096g/kg (25°C) [2)]
Specific gravity:	2.044 (23°C) [1)]
logPow:	5.73 [3)]

[3] Aldrin (reference)



Molecular formula:	$C_{12}H_8Cl_6$
CAS:	309-00-2
ENCS:	4-0303
MW:	364.91
mp:	104°C[1)]
bp:	145°C (0.27kPa) [4)]
SW:	0.0002g/kg (25°C) [2)]
Specific gravity:	1.6g/cm^3 [5)]
logPow:	6.50 [3)]

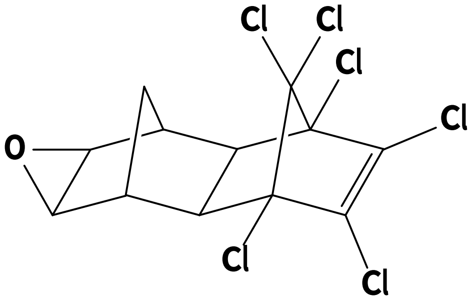
[4] Dieldrin (reference)



Molecular formula:	$C_{12}H_8Cl_6O$
CAS:	60-57-1
ENCS:	4-0299
MW:	380.91
mp:	176～177°C [1)]
bp:	330°C [5)]
SW:	0.00020g/kg (25°C) [2)]
Specific gravity:	1.75 (25°C) [2)]
logPow:	5.40 [3)]

(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, kPa: kilopascal (1 atom 101.3kPa).

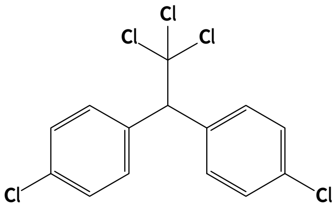
[5] Endrin (reference)



Molecular formula:	$C_{12}H_8Cl_6O$
CAS:	72-20-8
ENCS:	4-0299
MW:	380.91
mp:	200°C [6]
bp:	245°C (Decomposition) [6]
SW:	0.00025g/kg [2]
Specific gravity:	1.7g/cm^3 [6]
logPow:	5.20 [3]

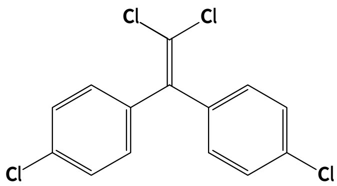
[6] DDTs

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



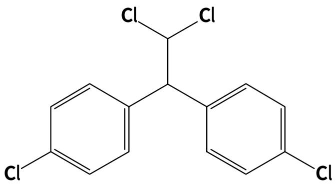
Molecular formula:	$C_{14}H_9Cl_5$
CAS:	50-29-3
ENCS:	4-0910
MW:	354.49
mp:	108.5°C [2]
bp:	260°C [2]
SW:	Insoluble [1]
Specific gravity:	1.6g/cm^3 [7]
logPow:	6.91 [3]

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



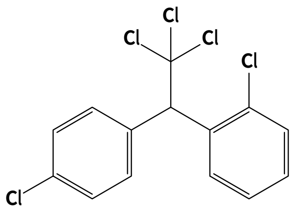
Molecular formula:	$C_{14}H_8Cl_4$
CAS:	72-55-9
ENCS:	No pertinence
MW:	318.03
mp:	89°C [2]
bp:	336°C [5]
SW:	0.12mg/L (25°C) [5]
Specific gravity:	Uncertain
logPow:	6.51 [3]

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



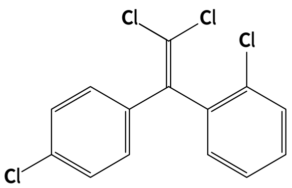
Molecular formula:	$C_{14}H_{10}Cl_4$
CAS:	72-54-8
ENCS:	No pertinence
MW:	320.04
mp:	109～110°C [1]
bp:	193°C (1mmHg) [2]
SW:	0.09mg/L (25°C) [5]
Specific gravity:	Uncertain
logPow:	6.02 [3]

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



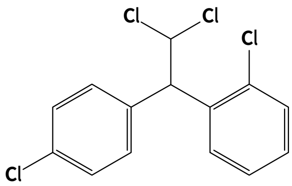
Molecular formula:	$C_{14}H_9Cl_5$
CAS:	789-02-6
ENCS:	No pertinence
MW:	354.49
mp:	Uncertain
bp:	Uncertain
SW:	Uncertain
Specific gravity:	Uncertain
logPow:	Uncertain

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



Molecular formula:	$C_{14}H_8Cl_4$
CAS:	3424-82-6
ENCS:	No pertinence
MW:	318.03
mp:	Uncertain
bp:	Uncertain
SW:	Uncertain
Specific gravity:	Uncertain
logPow:	Uncertain

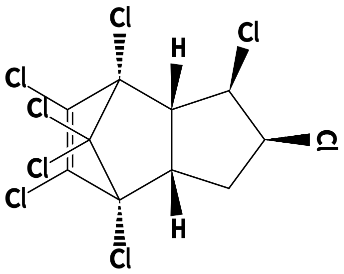
[6-6] *o,p'*-DDD



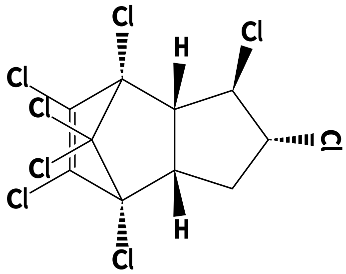
Molecular formula:	$C_{14}H_{10}Cl_4$
CAS:	53-19-0
ENCS:	No pertinence
MW:	320.04
mp:	76～78°C [1]
bp:	Uncertain
SW:	Uncertain
Specific gravity:	Uncertain
logPow:	Uncertain

[7] Chlordanes

[7-1] *cis*-Chlordane



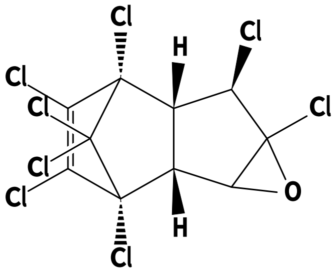
[7-2] *trans*-Chlordane



The following data are for both [7-1] and [7-2].

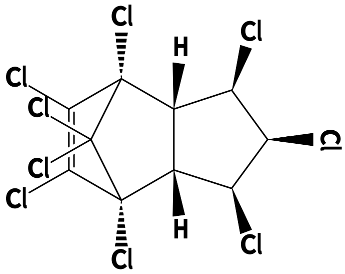
Molecular formula:	$C_{10}H_6Cl_8$
CAS:	5103-71-9 (*cis*), 5103-74-2 (*trans*)
ENCS:	4-637
MW:	409.78
mp:	106°C [1)]
bp:	175°C (1mmHg) [1)]
SW:	0.0006g/kg (25°C) [1)]
Specific gravity:	1.59～1.63 (25°C) [2)]
logPow:	6.16 [3)]

[7-3] Oxychlordane



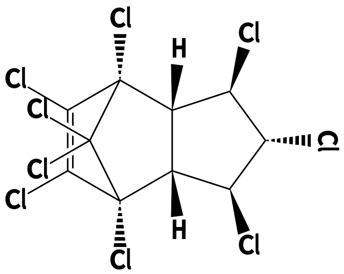
Molecular formula:	$C_{10}H_4Cl_8O$
CAS:	26880-48-8
ENCS:	No pertinence
MW:	423.76
mp:	100°C [1)]
bp:	Uncertain
SW:	Uncertain
Specific gravity:	Uncertain
logPow:	4.76[3)]

[7-4] *cis*-Nonachlor



Molecular formula:	$C_{10}H_5Cl_9$
CAS:	5103-73-1
ENCS:	No pertinence
MW:	444.22
mp:	Uncertain
bp:	Uncertain
SW:	Uncertain
Specific gravity:	Uncertain
logPow:	5.21[3)]

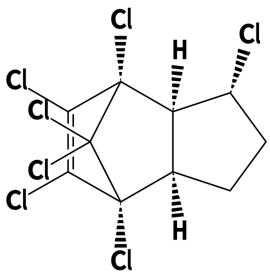
[7-5] *trans*-Nonachlor



Molecular formula:	$C_{10}H_5Cl_9$
CAS:	39765-80-5
ENCS:	No pertinence
MW:	444.22
mp:	Uncertain
bp:	Uncertain
SW:	Uncertain
Specific gravity:	Uncertain
logPow:	5.08[3)]

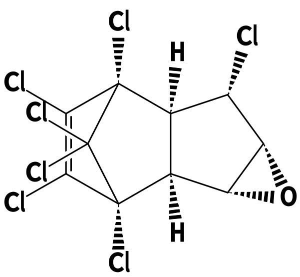
[8] Heptachlors

[8-1] Heptachlor

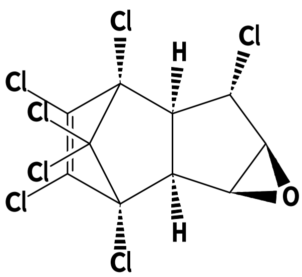


Molecular formula:	$C_{10}H_5Cl_7$
CAS:	76-44-8
ENCS:	4-637, 9-1646
MW:	373.32
mp:	95～96°C[2)]
bp:	Uncertain
SW:	0.00018g/kg (25°C) [1)]
Specific gravity:	1.57 (9°C) [1)]
logPow:	6.10 [3)]

[8-2] *cis*-Heptachlor epoxide



[8-3] *trans*-Heptachlor epoxide

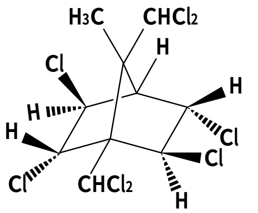


The following data are for both [8-2] and [8-3].

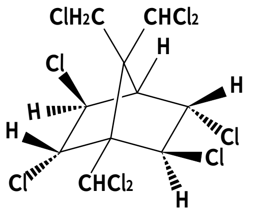
Molecular formula:	$C_{10}H_5Cl_7O$
CAS:	1024-57-3
ENCS:	No pertinence
MW:	389.32
mp:	160°C[1)]
bp:	Uncertain
SW:	Uncertain
Specific gravity:	Uncertain
logPow:	5.40[3)]

[9] Toxaphenes (reference)

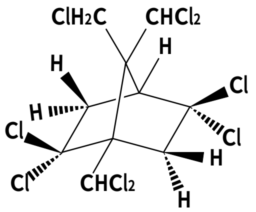
[9-1]
2-Endo,3-exo,5-endo,6-exo,8,8,10,10-octachlorobornane (Parlar-26)



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

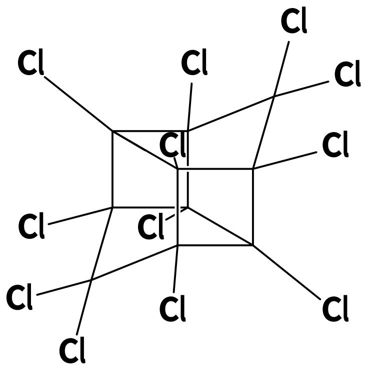


[9-3]
2,2,5,5,8,9,9,10,10-nonachlorobornane (Parlar-62)



Molecular formula: $C_{10}H_{10}Cl_8$([9-1]), $C_{10}H_9Cl_9$([9-2], [9-3])
CAS: 8001-35-2
ENCS: No pertinence
MW: 413.81 (Cl_8), 448.26 (Cl_9)
mp: 65～90°C [2)]
bp: Uncertain
SW: 3mg/L [2)]
Specific gravity: 1.630 (25°C) [2)]
logPow: 6.44 [2)]

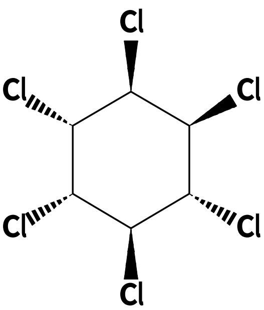
[10] Mirex (reference)



Molecular formula: $C_{10}Cl_{12}$
CAS: 2385-85-5
ENCS: No pertinence
MW: 545.54
mp: 485°C (Decomposition) [2)]
bp: Uncertain
SW: 0.000085g/kg (25°C) [1)]
Specific gravity: Uncertain
Molecular formula: 5.28 [3)]

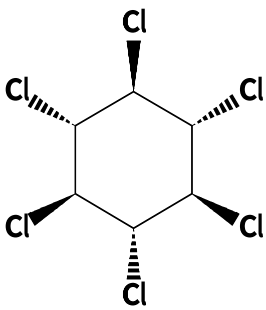
[11] HCHs(Hexachlorohexanes)

[11-1] *α*-HCH



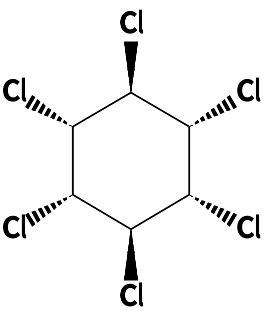
Molecular formula: $C_6H_6Cl_6$
CAS: 319-84-6
ENCS: 3-2250, 9-1652
MW: 290.83
mp: 158°C [1)]
bp: 288°C [9)]
SW: 0.00018g/kg (25°C) [2)]
Specific gravity: 1.87 (20°C) [10)]
Molecular formula: 3.80 [3)]

[11-2] *β*-HCH



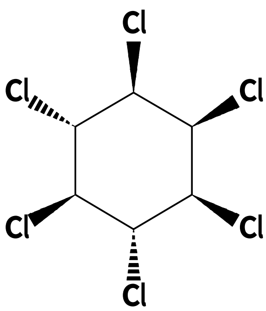
Molecular formula: $C_6H_6Cl_6$
CAS: 319-85-7
ENCS: 3-2250, 9-1652
MW: 290.83
mp: 309°C[11)]
bp: 60°C (0.50mmHg) [1)]
SW: 0.0002g/kg (25°C) [2)]
Specific gravity: 1.87 (20°C) [10)]
Molecular formula: 3.78 [1)]

[11-3] *γ*-HCH (synonym:Lindane)



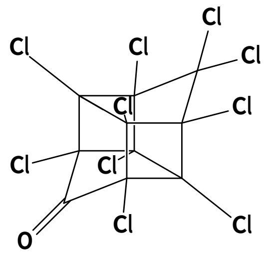
Molecular formula: $C_6H_6Cl_6$
CAS: 58-89-9
ENCS: 3-2250, 9-1652
MW: 290.83
mp: 112.5°C [1)]
bp: 323.4°C [1)]
SW: 0.0078g/kg (25°C) [1)]
Specific gravity: 1.85 (20°C) [10)]
Molecular formula: 3.72 [3)]

[11-4] *δ*-HCH



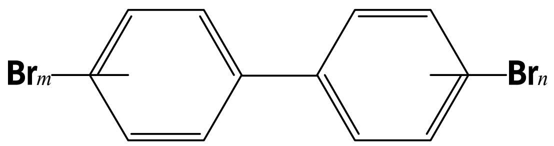
Molecular formula: $C_6H_6Cl_6$
CAS: 319-86-8
ENCS: 3-2250, 9-1652
MW: 290.83
mp: 141.5°C [1)]
bp: 60°C (0.36mmHg) [1)]
SW: Uncertain
Specific gravity: 1.87 (20°C) [10)]
Molecular formula: 4.14 [3)]

[12] Chlordecone



Molecular formula:	$C_{10}Cl_{10}O$
CAS:	143-50-0
ENCS:	No pertinence
MW:	490.64
mp:	350°C [2]
bp:	Not specified
sw:	7.6mg/L (24°C) [5]
Specific gravity:	1.61 (25°C) [1]
logPow:	3.45 [12]

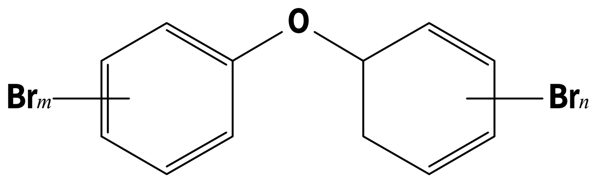
[13] Hexabromobiphenyls



m+n =6

Molecular formula:	$C_{12}H_4Br_6$
CAS:	36355-01-8
ENCS:	No pertinence
MW:	627.58
mp:	Not specified
bp:	Not specified
sw:	Not specified
Specific gravity:	Not specified
logPow:	Not specified

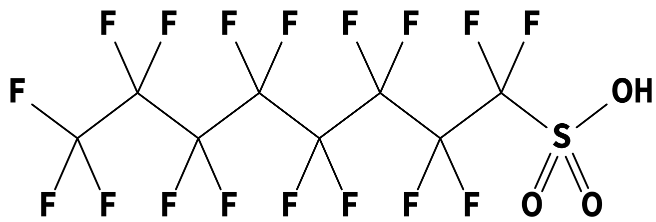
[14] Polybromodiphenyl ethers（Br_4～Br_{10}）



i = m+n =4～10

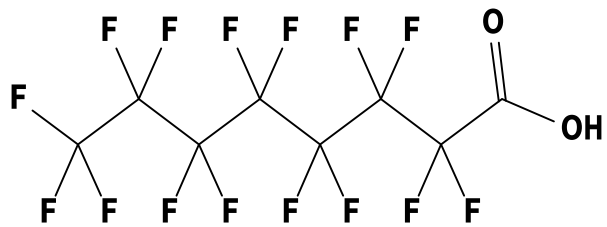
Molecular formula:	$C_{12}H_{(10-i)}Br_iO$ (i = m+n =4～10)
CAS:	40088-47-9 (Br_4), 32534-81-9 (Br_5), 36483-60-0 (Br_6), 68928-80-3 (Br_7), 32536-52-0 (Br_8), 63936-56-1 (Br_9), 1163-19-5 (Br_{10})
ENCS:	3-61 (Br_4), 3-2845 (Br_6)
MW:	485.79～959.17
mp:	Not specified
bp:	Not specified
sw:	Not specified
Specific gravity:	Not specified
logPow:	Not specified

[15] Perfluorooctane sulfonic acid (PFOS)



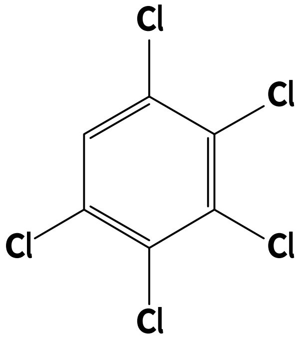
Molecular formula:	$C_8HF_{17}O_3S$
CAS:	1763-23-1
ENCS:	2-1595
MW:	500.13
mp:	>400°C (potassium salt) [13]
bp:	Uncertain
sw:	519mg/L (20°C, potassium salt) [13]
Specific gravity:	Uncertain
logPow:	Uncertain

[16] Perfluorooctanoic acid(PFOA)



Molecular formula:	$C_8HF_{15}O_2$
CAS:	335-67-1
ENCS:	2-1182, 2-2659
MW:	414.07
mp:	54.3°C [1]
bp:	192.4°C [1]
sw:	9.5g/L (20°C) [14]
Specific gravity:	$1.79g/cm^3$ [15]
logPow:	6.3[15]

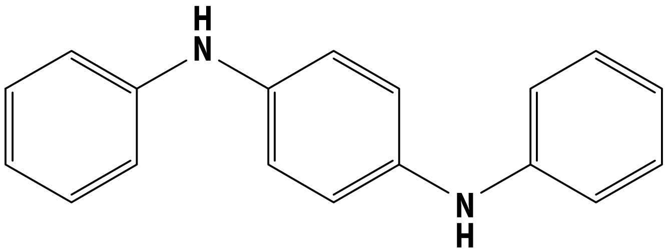
[17] Pentachlorobenzene



Molecular formula:	C_6HCl_5
CAS:	608-93-5
ENCS:	3-76
MW:	250.34
mp:	86°C [1)]
bp:	277°C [1)]
sw:	0.00050g/kg (25°C) [1)]
Specific gravity:	1.8342g/cm^3 (16°C) [1)]
logPow:	5.17[3)]

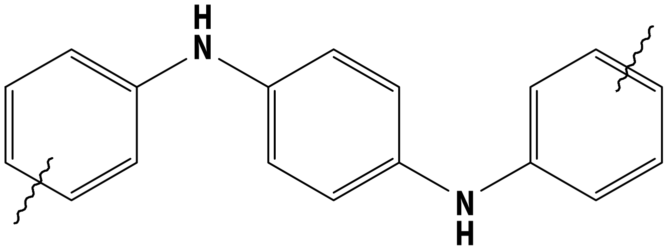
[18] *N*,*N′*-Diphenyl-*p*-phenylenediamines

[18-1] *N*,*N′*-Diphenyl-*p*-phenylenediamine



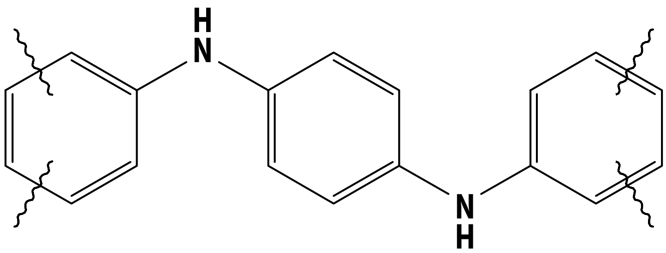
Molecular formula:	$C_{18}H_{16}N_2$
CAS:	74-31-7
ENCS:	3-145
MW:	260.33
mp:	150～151 °C [2)]
bp:	220～225°C (0.5mmHg) [2)]
sw:	Uncertain
Specific gravity:	1.2 [2)]
logPow:	Uncertain

[18-2] *N*,*N′*-Ditolyl-*p*-phenylenediamine



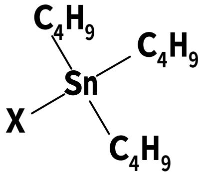
Molecular formula:	$C_{20}H_{20}N_2$
CAS:	27417-40-9
ENCS:	3-146, 3-365, 4-332
MW:	288.39
mp:	Uncertain
bp:	Uncertain
sw:	Uncertain
Specific gravity:	Uncertain
logPow:	Uncertain

[18-3] *N*,*N′*-Dixylyl-*p*-phenylenediamine



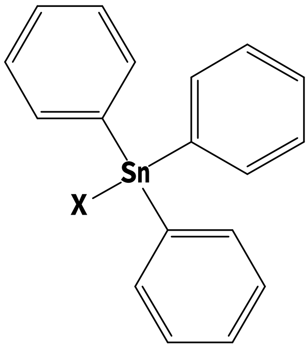
Molecular formula:	$C_{22}H_{24}N_2$
CAS:	28726-30-9
ENCS:	3-146
MW:	316.44
mp:	Uncertain
bp:	Uncertain
sw:	Uncertain
Specific gravity:	Uncertain
logPow:	Uncertain

[19] Tributyltin compounds



Molecular formula:	Not specified
CAS:	Not specified
ENCS:	Not specified
MW:	Not specified
mp:	Not specified
bp:	Not specified
sw:	Not specified
Specific gravity:	Not specified
logPow:	Not specified

[20] Triphenyltin compounds



Molecular formula:	Not specified
CAS:	Not specified
ENCS:	Not specified
MW:	Not specified
mp:	Not specified
bp:	Not specified
sw:	Not specified
Specific gravity:	Not specified
logPow:	Not specified

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12) IPCS, International Chemical Safety Cards, Chlordecone ICSC1432 (2003)
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14) OECD, Perfluorooctanoic Acid & Ammonium Perfluorooctanoate, SIDS Initial Assessment Profile for 26th SIAM (2008)
15) IPCS, International Chemical Safety Cards, Perfkuorooctanoic acid, ICSC1613 (2005)

3. Monitored site and procedure

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

(1) Organisations responsible for sampling

Local communities	Organisations responsible for sampling	Monitored media			
		Surface water	Sediment	Wildlife	Air
Hokkaido	Hokkaido Research Organization Environmental and Geological Research Department Institute of Environmental Sciences	○	○	○	○
Sapporo City	Sapporo City Institute of Public Health				○
Aomori Pref.	Aomori Prefectural Institute of Public Health and Environment	○	○		
	Aomori Prefectural Government Sanpachi District Administration Office Management and Local Coordination Division Hachinohe Environmental Management Office			○	
Iwate Pref.	Research Institute for Environmental Sciences and Public Health of Iwate Prefecture	○	○	○	○
Miyagi Pref.	Miyagi Prefectural Institute of Public Health and Environment	○	○	○	○
Sendai City	Sendai City Institute of Public Health		○		
Akita Pref.	Akita Research Center for Public Health and Environment	○	○		
Yamagata Pref.	Yamagata Institute of Environmental Sciences	○	○		
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				○
Saitama Pref.	Center for Environmental Science in Saitama	○			
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 Prefectural Institute of Public Health and Environment		○		○
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 Prefecture Health and Environment Research Institute	○	○		○
Shiga Pref.	Lake Biwa Environmental Research Institute	○	○	○	
Kyoto Pref.	Kyoto Prefectural Institute of Public Health and Environment	○	○		○
Kyoto City	Kyoto Prefectural Institute of Public Health and Environment	○	○		
Osaka Pref.	Research Institute of Environment, Agriculture and Fisheries, Osaka Prefectural Government	○	○	○	○
Osaka City	Osaka City Institute of Public Health and Environmental Sciences	○	○		
Hyogo Pref.	Hyogo Prefectural Agricultural Administration and Environment Division, Environment Bureau	○	○	○	○
Kobe City	Environmental Conservation and Guidance Division, Environment Bureau	○	○		○
Nara Pref.	Nara Prefectural Institute for Hygiene and Environment		○		○
Wakayama Pref.	Wakayama Prefectural Research Center of Environment and Public Health	○	○		

Local communities	Organisations responsible for sampling	Monitored media			
		Surface water	Sediment	Wildlife	Air
Tottori Pref.	Tottori Prefectural Institute of Public Health and Environment			○	
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 Technology Research Institute Health and Environment Center	○	○		
Hiroshima City	Hiroshima City Institute of Public Health			○	○
Yamaguchi Pref.	Yamaguchi Prefectural 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, Nagasaki Prefecture	○	○		
Kumamoto Pref.	Kumamoto Prefectural Institute of Public Health and Environmental Science	○			○
Oita Pref.	Oita Prefectural Environmental Preservation Division, Life and Environment Department		○	○	
Miyazaki Pref.	Miyazaki Prefectural Institute for Public Health and Environment	○	○		○
Kagoshima Pref.	Kagoshima Prefectural Institute forEnvironmental 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 2010.

(2) Monitored sites (areas)

Monitored sites (areas) are shown in Table 3-1-1 and Figure 3-1-1 for surface water, Table 3-1-2 and Figure 3-1-2 for sediment, Table 3-1-3 and Figure 3-1-3 for wildlife and Table 3-1-4 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	43	14	49	1
Sediment	48	14	64	1 or 3 *
Wildlife (bivalves)	6	14	6	1 or 3 **
Wildlife (fish)	15	14	18	1 or 3 **
Wildlife (birds)	2	14	2	1 or 3 **
Air (warm season)	35	13	37	1 or 3 ***
Air (cold season)	35	12	37	1 ***
All media	59	15	120	

(Note 1) For bottom/sediment cover, the plan for each monitoring point included three (3) specimen samples per point while three (3) samples for the target substances [19] Tributyltin compounds and [20] triphenyltin compounds were taken at each point. Samples to track other target substances were taken one sample per point, with each point having no more than three target substances.

(Note 2) For biological species (flora and fauna), five specimens were taken at each point. Three (3) samples were taken at each point for target substances [19] Tributyltin compounds and [20] Triphenyltin compounds. Samples to track other target substances were taken one sample per point, with each point having no more than three target substances.

(Note 3) For target substance group [18] Diphenyl-p-phenylenediamine, measurement was conducted for three samples at each point only in warm season. For other chemicals, one sample was gathered per point, in both warm and cold seasons.

Table 3-1-1 List of monitored sites (surface water) in the Environmental Monitoring in FY 2010

Local communities	Monitored sites	Sampling dates
Hokkaido	Suzuran-ohashi Bridge, Riv Tokachi(Obihiro City)	October 7, 2010
	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City)	October 6, 2010
Aomori Pref.	Lake Jusan	October 14, 2010
Iwate Pref.	Riv. Toyosawa(Hanamaki City)	October 13, 2010
Miyagi Pref.	Sendai Bay(Matsushima Bay)	October 20, 2010
Akita Pref.	Lake Hachiro	September 28, 2010
Yamagata Pref.	Mouth of Riv. Mogami(Sakata City)	November 8, 2010
Fukushima Pref.	Onahama Port	February 2, 2011
Ibaraki Pref.	Tonekamome-ohasi Bridge, Mouth of Riv. Tone(Kamisu City)	November 6, 2010
Tochigi Pref.	Riv. Tagawa(Utsunomiya City)	November 11, 2010
Saitama Pref.	Akigaseshusui of Riv. Arakawa	November 18, 2010
Chiba City	Mouth of Riv. Hanami(Chiba City)	November 12, 2010
Tokyo Met.	Mouth of Riv. Arakawa(Koto Ward)	November 15, 2010
	Mouth of Riv. Sumida(Minato Ward)	November 15, 2010
Yokohama City	Yokohama Port	November 24, 2010
Kawasaki City	Keihin Canal, Port of Kawasaki	November 8, 2010
Niigata Pref.	Lower Riv. Shinano(Niigata City)	September 29, 2010
Toyama Pref.	Hagiura-bashi Bridge, Mouth of Riv. Jintsu(Toyama City)	November 18, 2010
Ishikawa Pref.	Mouth of Riv. Sai(Kanazawa City)	October 13, 2010
Fukui Pref.	Mishima-bashi Bridge, Riv. Shono(Tsuruga City)	November 17, 2010
Nagano Pref.	Lake Suwa(center)	October 21, 2010
Shizuoka Pref.	Riv. Tenryu(Iwata City)	October 5, 2010
Aichi Pref.	Nagoya Port	October 28, 2010
Mie Pref.	Yokkaichi Port	October 26, 2010
Shiga Pref.	Lake Biwa(center, offshore of Karasaki)	November 16, 2010
Kyoto Pref.	Miyazu Port	October 6, 2010
Kyoto City	Miyamae-bashi Bridge, Miyamae Bridge, Riv. Katsura(Kyoto City)	November 11, 2010
Osaka Pref.	Mouth of Riv. Yamato(Sakai City)	November 19, 2010
Osaka City	Osaka Port	September 27, 2010
Hyogo Pref.	Offshore of Himeji	October 8, 2010
Kobe City	Kobe Port(center)	October 27, 2010
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa(Wakayama City)	October 27, 2010
Okayama Pref.	Offshore of Mizushima	October 27, 2010
Hiroshima Pref.	Kure Port	November 4, 2010
	Hiroshima Bay	November 4, 2010
Yamaguchi Pref.	Tokuyama Bay	October 21, 2010
	Offshore of Ube	October 13, 2010
	Offshore of Hagi	October 20, 2010
Tokushima Pref.	Mouth of Riv. Yoshino(Tokushima City)	October 7, 2010
Kagawa Pref.	Takamatsu Port	October 12, 2010
Kochi Pref.	Mouth of Riv. Shimanto(Shimanto City)	October 18, 2010
Kitakyushu City	Dokai Bay	October 27, 2010
Saga Pref.	Imari Bay	October 5, 2010
Nagasaki Pref.	Omura Bay	November 18, 2010
Kumamoto Pref.	Riv. Midori(Uto City)	October 18, 2010
Miyazaki Pref.	Mouth of Riv. Oyodo(Miyazaki City)	November 5, 2010
Kagoshima Pref.	Riv. Amori(Kirishima City)	October 27, 2010
	Gotanda-bashi Bridge, Riv. Gotanda(Ichikikushikino City)	November 16, 2010
Okinawa Pref.	Naha Port	November 5, 2010

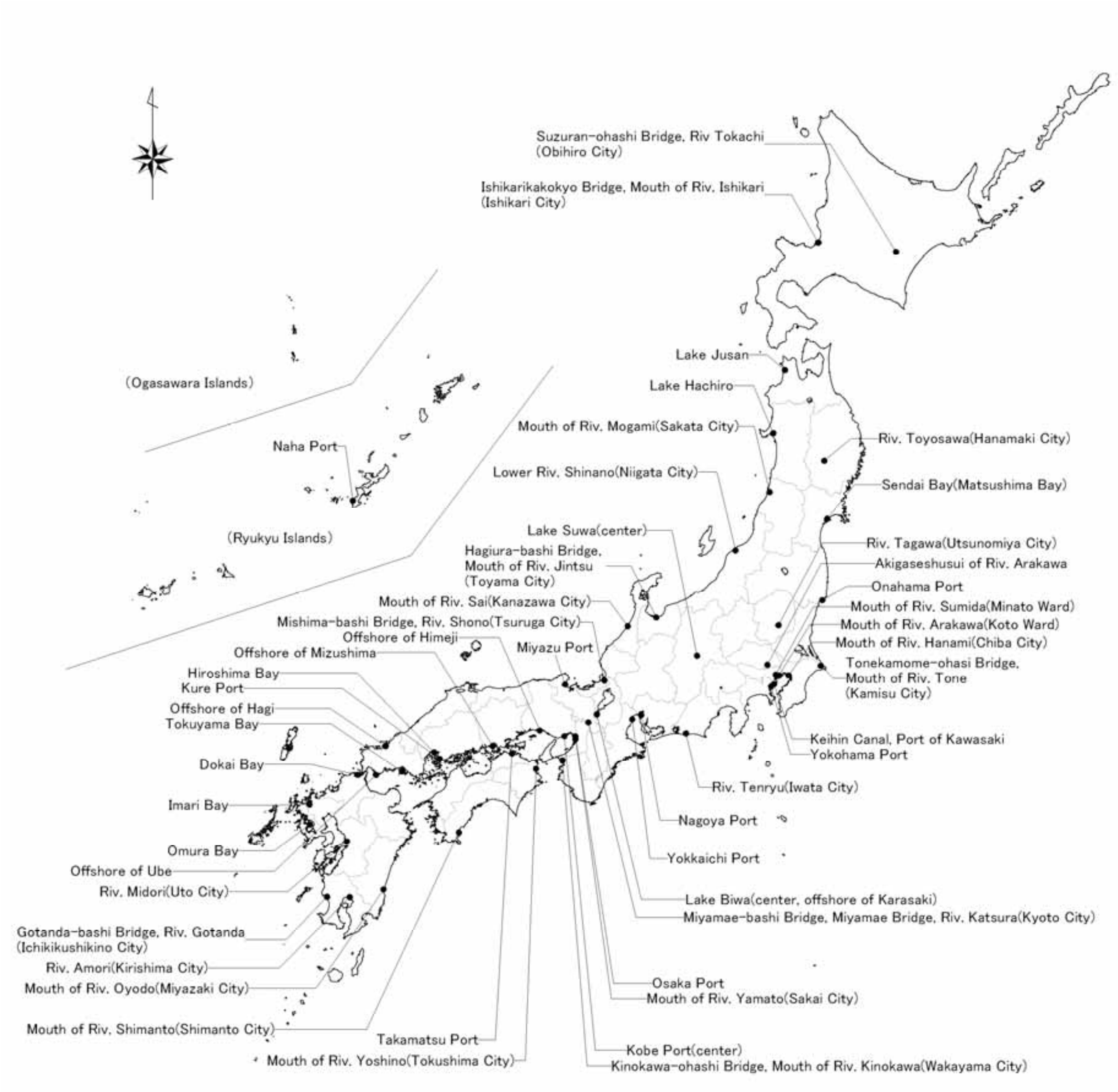

Figure 3-1-1 Monitored sites (surface water) in the Environmental Monitoring in FY 2010

Table 3-1-2 List of monitored sites (sediment) in the Environmental Monitoring in FY 2010

Local communities	Monitored sites	Sampling dates
Hokkaido	Onnenai-ohashi Bridge, Riv. Teshio(Bifuka Town)	October 18, 2010
	Suzuran-ohashi Bridge, Riv Tokachi(Obihiro City)	October 7, 2010
	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City)	October 6, 2010
	Tomakomai Port	September 14, 2010
Aomori Pref.	Lake Jusan	October 14, 2010
Iwate Pref.	Riv. Toyosawa(Hanamaki City)	October 13, 2010
Miyagi Pref.	Sendai Bay(Matsushima Bay)	October 20, 2010
Sendai City	Hirose-ohashi Bridge, Riv. Hirose(Sendai City)	November 17, 2010
Akita Pref.	Lake Hachiro	September 28, 2010
Yamagata Pref.	Mouth of Riv. Mogami(Sakata City)	November 8, 2010
Fukushima Pref.	Onahama Port	February 2, 2011
Ibaraki Pref.	Tonekamome-ohasi Bridge, Mouth of Riv. Tone(Kamisu City)	November 6, 2010
Tochigi Pref.	Riv. Tagawa(Utsunomiya City)	November 11, 2010
Chiba Pref.	Coast of Ichihara and Anegasaki	October 27, 2010
Chiba City	Mouth of Riv. Hanami(Chiba City)	November 12, 2010
Tokyo Met.	Mouth of Riv. Arakawa(Koto Ward)	November 15, 2010
	Mouth of Riv. Sumida(Minato Ward)	November 15, 2010
Yokohama City	Yokohama Port	November 24, 2010
Kawasaki City	Mouth of Riv. Tama(Kawasaki City)	November 8, 2010
	Keihin Canal, Port of Kawasaki	November 8, 2010
Niigata Pref.	Lower Riv. Shinano(Niigata City)	September 29, 2010
Toyama Pref.	Hagiura-bashi Bridge, Mouth of Riv. Jintsu(Toyama City)	November 18, 2010
Ishikawa Pref.	Mouth of Riv. Sai(Kanazawa City)	October 13, 2010
Fukui Pref.	Mishima-bashi Bridge, Riv. Shono(Tsuruga City)	November 17, 2010
Yamanashi Pref.	Senshu-bashi Bridge, Riv. Arakawa(Kofu City)	October 26, 2010
Nagano Pref.	Lake Suwa(center)	October 21, 2010
Shizuoka Pref.	Shimizu Port	October 13, 2010
	Riv. Tenryu(Iwata City)	October 5, 2010
Aichi Pref.	Kinuura Port	October 28, 2010
	Nagoya Port	October 28, 2010
Mie Pref.	Yokkaichi Port	October 26, 2010
	Toba Port	October 19, 2010
Shiga Pref.	Lake Biwa(center, offshore of Minamihira)	November 16, 2010
	Lake Biwa(center, offshore of Karasaki)	November 16, 2010
Kyoto Pref.	Miyazu Port	October 6, 2010
Kyoto City	Miyamae-bashi Bridge, Miyamae Bridge, Riv. Katsura(Kyoto City)	November 11, 2010
Osaka Pref.	Mouth of Riv. Yamato(Sakai City)	November 19, 2010
Osaka City	Osaka Port	September 27, 2010
	Outside Osaka Port	September 27, 2010
	Mouth of Riv. Yodo(Osaka City)	September 27, 2010
	Riv. Yodo(Osaka City)	October 6, 2010
Hyogo Pref.	Offshore of Himeji	October 8, 2010
Kobe City	Kobe Port(center)	October 27, 2010
Nara Pref.	Riv. Yamato(Ooji Town)	November 8, 2010
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa(Wakayama City)	October 27, 2010
Okayama Pref.	Offshore of Mizushima	October 27, 2010
Hiroshima Pref.	Kure Port	November 4, 2010
	Hiroshima Bay	November 4, 2010
Yamaguchi Pref.	Tokuyama Bay	October 21, 2010
	Offshore of Ube	October 13, 2010
	Offshore of Hagi	October 20, 2010
Tokushima Pref.	Mouth of Riv. Yoshino(Tokushima City)	October 7, 2010
Kagawa Pref.	Takamatsu Port	October 12, 2010
Ehime Pref.	Niihama Port	November 16, 2010
Kochi Pref.	Mouth of Riv. Shimanto(Shimanto City)	October 18, 2010
Kitakyushu City	Dokai Bay	October 27, 2010
Fukuoka City	Hakata Bay	October 19, 2010
Saga Pref.	Imari Bay	October 5, 2010
Nagasaki Pref.	Omura Bay	November 18, 2010
Oita Pref.	Mouth of Riv. Oita(Oita City)	November 19, 2010
Miyazaki Pref.	Mouth of Riv. Oyodo(Miyazaki City)	November 5, 2010
Kagoshima Pref.	Riv. Amori(Kirishima City)	October 27, 2010
	Gotanda-bashi Bridge, Riv. Gotanda(Ichikikushikino City)	November 16, 2010
Okinawa Pref.	Naha Port	November 5, 2010

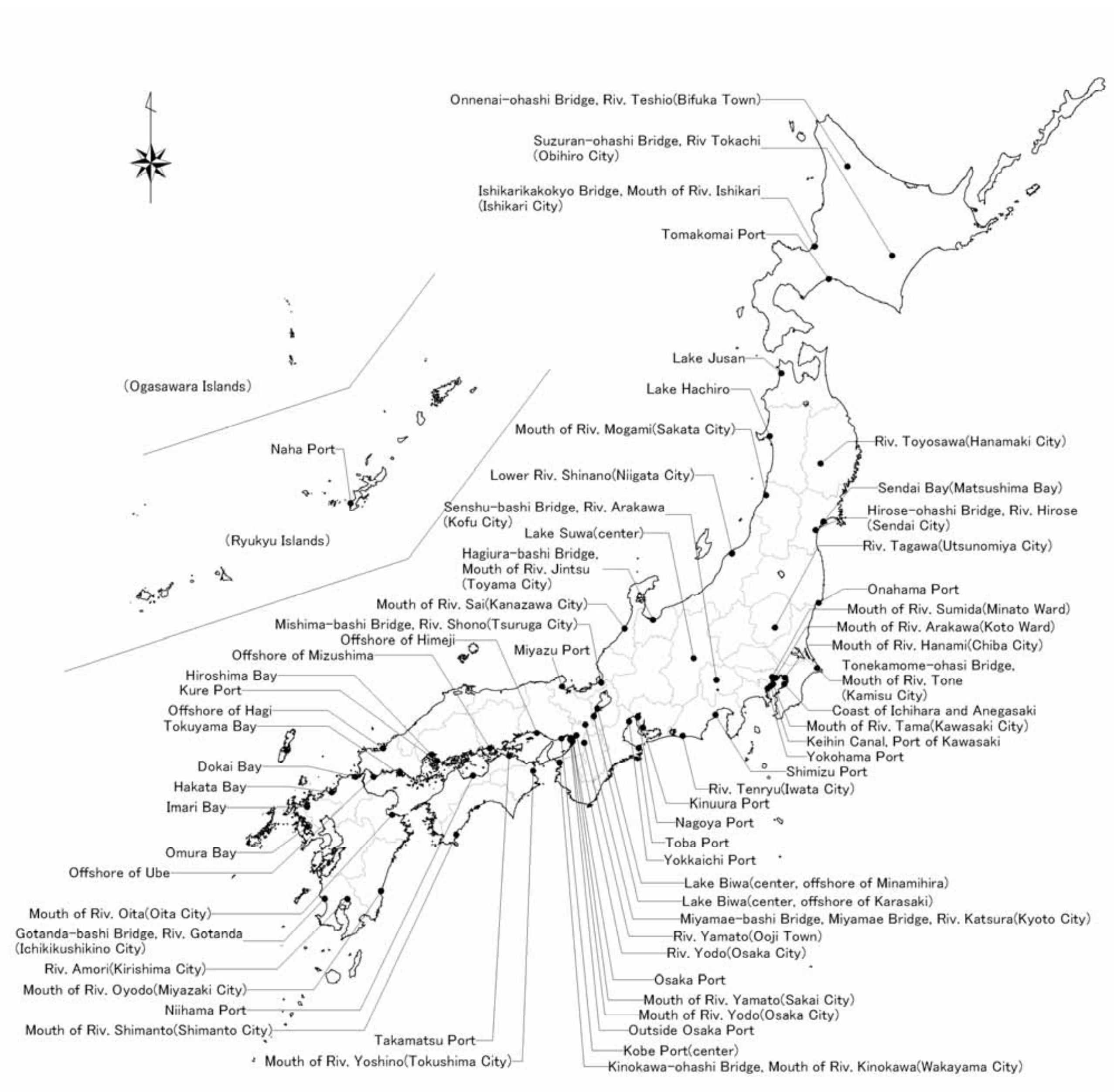

Figure 3-1-2 Monitored sites (sediment) in the Environmental Monitoring in FY 2010

Table 3-1-3 List of monitored areas (wildlife) in the Environmental Monitoring in FY 2010

Local communities	Monitored sites	Sampling dates	Wildlife species	
Hokkaido	Offshore of Kushiro	September 1, 2010	Fish	Rock greenling (*Hexagrammos lagocephalus*)
	Offshore of Kushiro	October 18, 2010	Fish	Chum salmon (*Oncorhynchus keta*)
	Offshore of Japan Sea (offshore of Iwanai)	November 1, 2010	Fish	Greenling (*Hexagrammos otakii*)
Aomori Pref.	Kabu Is.(Hachinohe City)	July 8, 2010	Birds	Black-taild gull (*Larus crassirostris*)
Iwate Pref.	Yamada Bay	November 24, 2010	Bibalves	Blue mussel (*Mytilus galloprovincialis*)
	Yamada Bay	December 1, 2010	Fish	Greenling (*Hexagrammos otakii*)
	Suburb of Morioka City	August 11, 2010	Birds	Gray starling (*Sturnus cineraceus*)
Miyagi Pref.	Sendai Bay(Matsushima Bay)	September 6, 2010	Fish	Sea bass (*Lateolabrax japonicus*)
Ibaraki Pref.	Offshore of Joban	December 1, 2010	Fish	Pacific saury (*Cololabis saira*)
Tokyo Met.	Tokyo Bay	August 26, 2010	Fish	Sea bass (*Lateolabrax japonicus*)
Yokohama City	Yokohama Port	October 19, 2010	Bibalves	Green mussel (*Perna viridis*)
Kawasaki City	Offshore of Ogishima Island, Port of Kawasaki	October 12, 2010	Fish	Sea bass (*Lateolabrax japonicus*)
Nagoya City	Nagoya Port	August 18, 2010	Fish	Striped mullet (*Mugil cephalus*)
Shiga Pref.	Lake Biwa, Riv. Azumi (Takashima City)	April 2, 2010	Fish	Dace (*Tribolodon hakonensis*)
Osaka Pref.	Osaka Bay	August 23, 2010	Fish	Sea bass (*Lateolabrax japonicus*)
Hyogo Pref.	Offshore of Himeji	November 25, 2010	Fish	Sea bass (*Lateolabrax japonicus*)
Tottori Pref.	Nakaumi	October 17, 2010	Fish	Sea bass (*Lateolabrax japonicus*)
Shimane Pref.	Shichirui Bay, Shimane Peninsula	October 11, 2010	Bibalves	Blue mussel (*Mytilus galloprovincialis*)
Hiroshima City	Hiroshima Bay	November 18, 2010	Fish	Sea bass (*Lateolabrax japonicus*)
Tokushima Pref.	Naruto	October 12, 2010	Bibalves	Hard-shelled mussel (*Mytilus coruscus*)
Kagawa Pref.	Takamatsu Port	September 1, 2010	Bibalves	Hard-shelled mussel (*Mytilus coruscus*)
Kochi Pref.	Mouth of Riv. Shimanto(Shimanto City)	October 18, 2010	Fish	Sea bass (*Lateolabrax japonicus*)
Kitakyushu City	Dokai Bay	July 27, 2010	Bibalves	Blue mussel (*Mytilus galloprovincialis*)
Oita Pref.	Mouth of Riv. Oita(Oita City)	November 29, 2010	Fish	Sea bass (*Lateolabrax japonicus*)
Kagoshima Pref.	West Coast of Satsuma Peninsula	November 29, 2010	Fish	Sea bass (*Lateolabrax japonicus*)
Okinawa Pref.	Nakagusuku Bay	December 13, 2010	Fish	Okinawa seabeam (*Acanthopagrus sivicolus*)

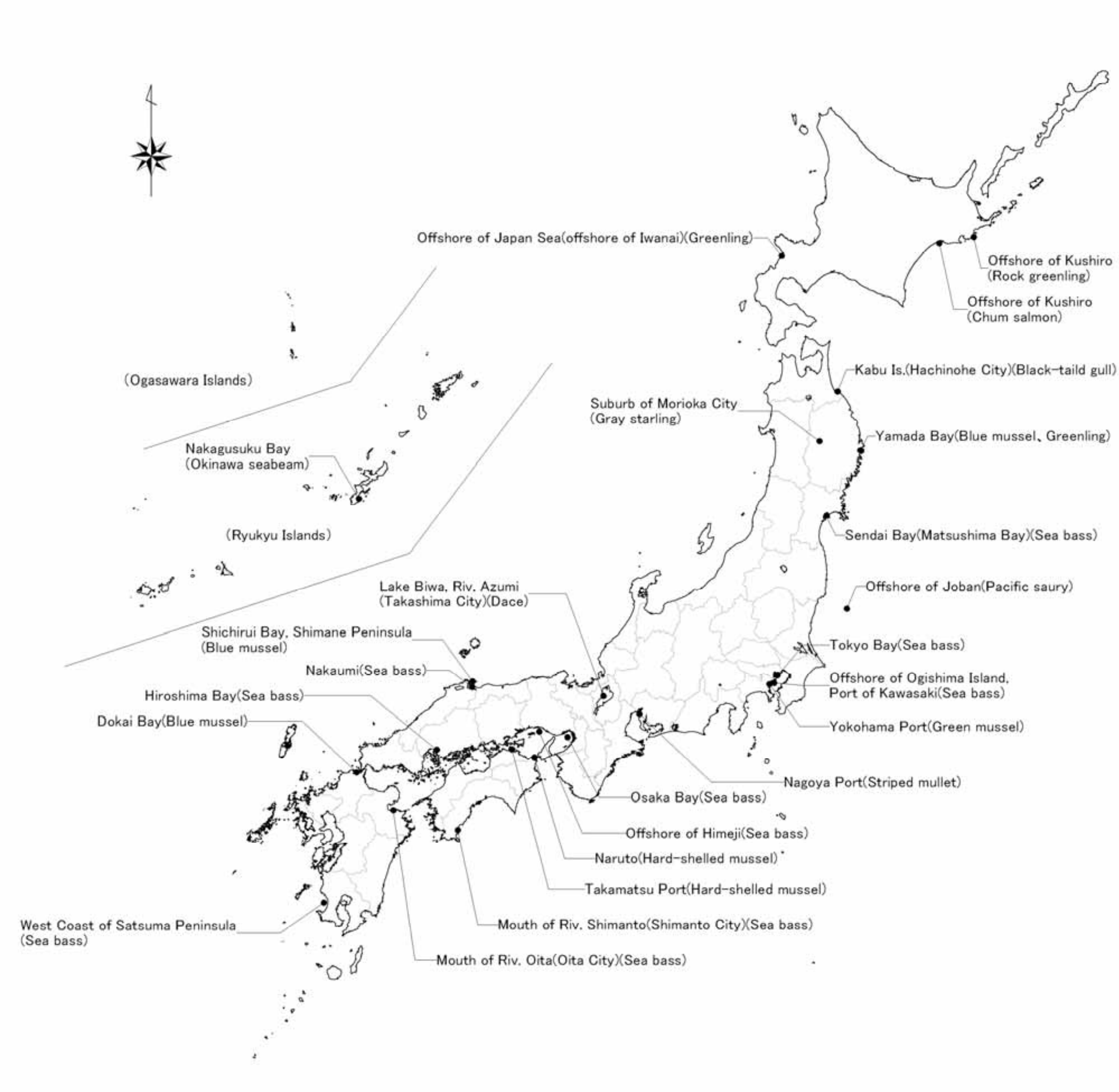

Figure 3-1-3 Monitored areas (wildlife) in the Environmental Monitoring in FY 2010

Table 3-1-4 List of monitored sites (air) in the Environmental Monitoring in FY 2010

Local communities	Monitored sites	Sampling dates (Warm season)	Sampling dates (Cold season)
Hokkaido	Kamikawa Combination Office (Asahikawa City)	September 14~21, 2010* or September 14~17, 2010**,***	November 15~22, 2010* or November 15~17 and 18~19, 2010**
Sapporo City	Sapporo Art Park(Sapporo City)	September 27~30, 2010	November 16~17,18~19, 2010 and January 6~7, 2011
Iwate Pref.	Amihari Ski Area(Shizukuishi Town)	August 30~September 2, 2010*,** or September 13~16***, 2010	November 8~11, 2010
Miyagi Pref.	Miyagi Prefectural Institute of Public Health and Environment(Sendai City)	September 27~October 4, 2010*,September 28~October 1, 2010** or September 28~October 2, 2010***	December 6~13, 2010* or December 6~8 and 14~15, 2010**
Ibaraki Pref.	Ibaraki Kasumigaura Environmental Science Center(Tsuchiura City)	September 9~16, 2010* or September 9~12, 2010**,***	December 7~14, 2010* or December 7~10, 2010**
Gunma Pref.	Gunma Prefectural Institute of Public Health and Environmental Sciences(Maebashi City)	October 12~19, 2010* or October 12~15, 2010**,***	November 29~December 6, 2010* or November 29~December 2, 2010**
Chiba Pref.	Ichihara-Matsuzaki Air Quality Monitoring Station(Ichihara City)	September 27~October 4, 2010* or September 27~30, 2010**,***	November 29~December 6, 2010* or November 29~December 2, 2010**
Tokyo Met.	Tokyo Metropolitan Research Institutefor Environmental Protection (Koto Ward)	September 3~10, 2010*,September 6~9, 2010** or September 6~8 and 9~10, 2010***	November 4~11, 2010* or November 8~11, 2010**
	Chichijima Island	September 27~30, 2010	November 21~28, 2010* or November 21~24, 2010**
Kanagawa Pref.	Kanagawa Environmental Research Center(Hiratsuka City)	September 6~9, 2010	November 15~18, 2010
Yokohama City	Yokohama Environmental Science Research Institute(Yokohama City)	September 10~17, 2010*, September 14~17, 2010** or September 7~10, 2010***	December 10~17, 2010* or December 14~17, 2010**
Niigata Pref.	Oyama Air Quality Monitoring Station(Niigata City)	September 28~October 1, 2010	December 13~16, 2010
Toyama Pref.	Tonami Air Quality Monitoring Station(Tonami City)	September 7~10, 2010*,** or September 14~17, 2010***	December 6~9, 2010
Ishikawa Pref.	Ishikawa Prefectural Institute of Public Health and Environmental Science (Kanazawa City)	September 28~October 1, 2010	December 14~17, 2010
Yamanashi Pref.	Yamanashi Prefectural Institute of Public Health and Environment(Kofu City)	September 14~17, 2010	November 30~December 3, 2010
Nagano Pref.	Nagano Environmental Conservation Research Institute(Nagano City)	September 7~14, 2010*, September 7~10, 2010** or September 13~16, 2010***	November 8~15, 2010* or November 9~12, 2010**
Gifu Pref.	Gifu Prefectural Research Institute for Health and Environmental Sciences(Kakamigahara City)	October 12~15, 2010	November 29~December 2, 2010
Nagoya City	Chikusa Ward Heiwa Park (Nagoya City)	September 22~29, 2010* or September 27~30, 2010**,***	December 7~14, 2010* or December 7~10, 2010**
Mie Pref.	Mie Prefecture Health and Environment Research Institute(Yokkaichi City)	September 13~16, 2010	December 13~16, 2010
Kyoto Pref.	Kyoto Prefecture Joyo Senior High School(Joyo City)	October 12~15, 2010	December 14~17, 2010
Osaka Pref.	Research Institute of Environment, Agriculture and Fisheries, Osaka Prefectural Government(Osaka City)	September 27~30, 2010	November 29~December 2, 2010
Hyogo Pref.	Hyogo Prefectural Environmental Research Center(Kobe City)	August 30~September 2, 2010*,** or October 13~15 and 26~27, 2010***	November 29~December 2, 2010
Kobe City	Fukiai Air Quality Monitoring Station(Kobe City)	September 27~30, 2010*,** or October 4~7, 2010***	November 29~December 2, 2010
Nara Pref.	Tenri Air Quality Monitoring Station(Tenri City)	September 27~30, 2010*,** or September 27~29 and 30~October 1, 2010***	December 13~16, 2010* or December 14~17, 2010**

Local communities	Monitored sites	Sampling dates (Warm season)	Sampling dates (Cold season)
Shimane Pref.	Oki National Acid Rain Observatory(Okinoshima Town)	September 14~17, 2010	November 22~25, 2010
Hiroshima City	Hiroshima City Kokutaiji Junior High School(Hiroshima City)	September 13~16, 2010	November 16~19, 2010
Yamaguchi Pref.	Yamaguchi Prefectural Public Health and Environment(Yamaguchi City)	September 14~21, 2010*,September 14~17, 2010** or September 15~18, 2010***	November 26~December 3, 2010* or November 30~December 3, 2010**
	Hagi City Government Building, Mishima Branch(Hagi City)	September 14~21, 2010* or September 14~17, 2010**,***	November 26~December 3, 2010* or November 30~December 3, 2010**
Tokushima Pref.	Tokushima Prefectural Institute of Public Health and Environmental Sciences(Tokushima City)	September 27~30, 2010*,** or October 4~7, 2010***	December 6~9, 2010
Kagawa Pref.	Takamatsu Joint Prefectural Government Building (Takamatsu City)	September 8~15, 2010*,September 8~11, 2010** or September 10~13, 2010***	November 17~24, 2010* or November 17~20, 2010**
	Kagawa Prefectural Public Swimming Pool(Takamatsu City) as a reference site		
Ehime Pref.	Ehime Prefectural Government Nanyo Regional Office (Uwajima City)	October 5~8, 2010	November 8~11, 2010
Fukuoka Pref.	Omuta City Government Building(Omuta City)	September 27~30, 2010	November 29~December 2, 2010
Saga Pref.	Saga Prefectural Environmental Research Center(Saga City)	September 7~14, 2010*,September 7~10, 2010** or September 14~17, 2010***	November 9~16, 2010* or November 9~12, 2010**
Kumamoto Pref.	Kumamoto Prefectural Institute of Public Health and Environmental Science(Udo City)	September 27~30, 2010	December 13~16, 2010
Miyazaki Pref.	Miyazaki Prefectural Institute for Public Health and Environment (Miyazaki City)	September 7~14, 2010* or September 7~10, 2010**,***	November 22~29, 2010* or November 22~25, 2010**
Kagoshima Pref.	Kagoshima Prefectural Institute for Environmental Research and Public Health(Kagoshima City)	September 6~8 and 9~10, 2010*,** or September 13~16, 2010***	December 6~7,8~9 and 9~10, 2010
Okinawa Pref.	Cape Hedo(Kunigami Village)	September 27~30, 2010	November 29~December 2, 2010

(Note) " * " means sampling except [17] Pentachlorobenzene and [18] *N,N'*-Diphenyl-p-phenylenediamines. " ** " means sampling [17] Pentachlorobenzene.” *** " means sampling [18] *N,N'*-Diphenyl-p-phenylenediamines.

Figure 3-1-4 Monitored sites (air) in the Environmental Monitoring in FY 2010

(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: 3 bivalves (predominantly blue mussel), 8 fishes (predominantly sea bass), and 2 birds, namely, 13 species in total.

The properties of the species determined as targets in the FY 2009 monitoring are shown in Table 3-2. Moreover, Table 3-3 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 3-2 Properties of target species

Species		Properties	Monitored areas	Aim of monitoring	Notes
Bibalves	Blue mussel (*Mytilus galloprovincialis*)	Distributed worldwide, excluding tropical zones Adheres to rocks in inner bays and to bridge piers	・Yamada Bay ・Coast of Noto Peninsula Shitirui Bay • Dokai Bay	Follow-up of the environmental fate and persistency in specific areas	Monitored in the 3 areas with different levels of persistency
	Hard-shelled mussel (*Mytilus coruscus*)	Distributed in various areas of southern Hokkaido and southward 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	
	Green mussel (*Perna viridis*)	Distribution ranges from southern Honshu island, to the southernmost reaches of Japan Adheres to sheltered rock faces or harbor pilings.	・Yokohama Port	Follow-up of the environmental fate and persistency in specific areas	
Fish	Greenling (*Hexagrammos otakki*)	Distributed from Hokkaido to southern Japan, the Korean Peninsula, and China 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 lagocephalus*)	Lives in cold-current areas of Hidaka and eastward (Hokkaido) 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*)	Distributed widely in northern Pacific Ocean Migrates around Japanese Archipelago; in Chishima in autumn and northern Kyushu in winter 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*)	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 Runs the Tone River on the Pacific Ocean side and rivers in Yamaguchi Prefecture and northward on the Sea of Japan side in Japan 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*)	Distributed around the shores of various areas in Japan, the Korean Peninsula, and the coastal areas of China Sometimes lives in a freshwater environment and brackish-water regions during its life cycle 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 ・Mouth of Riv. Oita ・West Coast of Satsuma Peninsula	Follow-up of the environmental fate and persistency in specific areas	Monitored in the 10 areas with different levels of persistency
	Striped mullet (M*ugil cephalus*)	Distributed widely in the worldwide tropical zones and subtropical zones Sometimes lives in a freshwater environment and brackish-water regions during its life cycle	・Nagoya Bay	Follow-up of the environmental fate and persistency in specific areas	

Species		Properties	Monitored areas	Aim of monitoring	Notes
	Okinawa seabeam (*Acanthopagrus sivicolus*)	Distributed around Nansei Shoto (Ryukyu Islands) Lives in coral reefs and in bays into which rivers flow	・Kanagusuku Bay	Follow-up of the environmental fate and persistency in specific areas	
	Dace (*Tribolodon hakonensis*)	Distributed widely in freshwater environments throughout Japan 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*)	Distributed widely in the Far East (Related species are distributed worldwide) Eats primarily insects	・Morioka City	Follow-up of the environmental fate and persistency in northern Japan	
	Black-taild gull (*Larus crassirostris*)	Breeds mainly in the sea off Japan Breeds in groups at shore reefs and in grassy fields	・Kabu Is. (Hachinohe City)	Follow-up of the environmental fate and persistency in specific areas	

Table 3-3-1 Basic data of specimens (bivalves as wildlife) in the Environmental Monitoring in FY 2010

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, 2010	Uncertain	148	32.1～ 88.2 (45.7)	8.1～ 10.7 (8.8)	79.2	2.2
	2		Uncertain	197	25.3～ 57.1 (36.0)	7.7～ 8.3 (8.0)	79.8	2.3
	3		Uncertain	258	18.4～ 46.5 (30.1)	7.1～ 8.0 (7.5)	80.1	2.1
	4		Uncertain	381	16.8～ 33.6 (24.6)	6.7～ 7.3 (7.0)	81.1	2.0
	5		Uncertain	468	8.5～ 27.4 (13.5)	5.2～ 6.8 (6.0)	81.3	1.9
Green mussel *Perna viridis* (Yokohama Port)	1	October, 2010	Mixed	583	1.5～ 3.7 (2.4)	2.6～ 3.7 (3.1)	82	1.5
	2		Mixed	663	1.2～ 4.0 (2.1)	2.6～ 3.5 (3.0)	83	1.5
	3		Mixed	762	1.2～ 3.0 (1.9)	2.5～ 3.4 (2.9)	83	1.1
	4		Mixed	692	1.3～ 3.0 (2.1)	2.6～ 3.5 (3.0)	84	1.2
	5		Mixed	680	1.2～ 3.0 (2.1)	2.7～ 3.3 (3.0)	83	1.1
Blue mussel *Mytilus galloprovincialis* (Shitirui Bay)	1	October, 2010	Uncertain	40	130.8～ 298.9 (190.7)	9.6～ 14.2 (11.4)	71.6	2.0
	2		Uncertain	80	98.0～ 177.1 (133.5)	9.1～ 12.1 (10.5)	72.3	2.5
	3		Uncertain	400	53.6～ 150.4 (91.6)	7.3～ 10.4 (9.1)	80.9	1.4
	4		Uncertain	510	14.1～ 108.3 (60.2)	3.8～ 9.7 (7.0)	81.6	1.4
	5		Uncertain	600	12.7～ 21.1 (16.5)	3.2～ 4.2 (3.8)	80.5	1.6
Hard-shelled mussel *Mytilus coruscus* (Naruto)	1	October, 2010	Mixed	21	268.0～ 437.5 (345)	13.2～ 16.5 (15.0)	72.4	1.6
	2		Mixed	20	347.1～ 533.2 (436)	15.0～ 18.5 (16.3)	71.6	1.3
	3		Mixed	19	364.1～ 517.2 (428)	14.5～ 18.0 (16.5)	73.4	1.3
	4		Mixed	18	363.2～ 591.7 (471)	15.3～ 19.2 (17.3)	64.4	1.2
	5		Mixed	17	391.9～ 671.6 (524)	17.0～ 19.6 (18.1)	60.7	0.7
Hard-shelled mussel *Mytilus coruscus* (Takamatsu Port)	1	September, 2010	Uncertain	28	72.2～ 266.1 (155.3)	8.5～ 14.5 (11.6)	67.6	2.8
	2		Uncertain	32	74.4～ 311.0 (156.2)	9.1～ 15.6 (11.3)	69.3	2.0
	3		Uncertain	25	79.9～ 313.0 (185.5)	8.5～ 15.5 (12.4)	71.9	3.0
	4		Uncertain	42	35.3～ 280.1 (96.3)	7.6～ 14.5 (10.0)	74.5	2.7
	5		Uncertain	42	76.4～ 256.7 (138.8)	9.5～ 14.0 (11.3)	76.1	2.4
Purplish bifurcate mussel *Septifer virgatus* (Dokai Bay)	1	July, 2010	Mixed	1,100	1.6～ 8.2 (2.8)	2.4～ 4.0 (3.1)	82	2.3

Table 3-3-2 Basic data of specimens (fish as wildlife) in the Environmental Monitoring in FY 2010

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	September, 2010	Mixed	6	615 ～ 855 (741)	36 ～ 41 (38)	74.5	1.5
	2		Mixed	7	525 ～ 785 (628)	35 ～ 39 (36)	75.5	1.2
	3		Mixed	7	545 ～ 755 (616)	35 ～ 38 (36)	74.8	0.2
	4		Mixed	7	545 ～ 745 (642)	34 ～ 38 (36)	74.8	1.7
	5		Mixed	7	545 ～ 675 (612)	34 ～ 37 (36)	74.7	2.7
Chum salmon *Oncorhynchus keta* (Offshore of Kushiro)	1	October, 2010	Female	1	4,500	70	72.3	1.6
	2		Female	1	4,900	71	71.9	2.0
	3		Female	1	4,300	71	72.4	1.1
	4		Male	1	3,800	68	68.2	4.0
	5		Female	1	4,500	69	72.4	1.5
Greenling *Hexagrammos lagocephalus* (Offshore of Iwanai)	1	November, 2010	Mixed	4	815 ～ 1,535 (1,100)	41 ～ 47 (44)	72.4	1.8
	2		Mixed	6	465 ～ 1,325 (768)	34 ～ 45 (38)	71.6	2.1
	3		Mixed	5	625 ～ 1,275 (879)	38 ～ 46 (41)	72.4	1.8
	4		Mixed	6	345 ～ 1,595 (800)	30 ～ 47 (38)	73.3	2.0
	5		Mixed	6	485 ～ 1,835 (823)	33 ～ 48 (37)	73.3	1.8
Greenling *Hexagrammos lagocephalus* (Yamada Bay)	1	December, 2010	Uncertain	6	608.0～ 744.5 (681.6)	35.4～ 37.1 (36.4)	72.4	2.8
	2		Uncertain	8	435.1～ 695.0 (541.3)	33.6～ 35.0 (34.2)	73.1	3.4
	3		Uncertain	11	402.5～ 547.9 (455.5)	31.8～ 33.4 (32.3)	74.0	3.6
	4		Uncertain	12	338.8～ 593.2 (431.4)	30.3～ 31.6 (31.0)	73.4	3.8
	5		Uncertain	17	204.0～ 449.8 (329.2)	24.8～ 29.9 (28.3)	74.0	3.6
Sea bass *Lateolabrax japonicus* (Matsushima Bay)	1	September, 2010	Mixed	28	142～ 219 (185)	20.5～ 23.7 (22.3)	73.6	1.9
	2		Mixed	25	159～ 307 (196)	21.3～ 27.6 (22.6)	74.4	1.7
	3		Mixed	31	159～ 255 (187)	20.8～ 26.0 (22.4)	73.7	1.3
	4		Mixed	30	159～ 322 (202)	21.3～ 28.0 (23.3)	73.7	1.5
	5		Mixed	30	140～ 333 (190)	20.3～ 27.7 (22.9)	74.3	1.3
Pacific saury *Cololabis saira* (Offshore of Joban)	1	December, 2010	Uncertain	35	69 ～ 115 (101)	24 ～ 29 (27)	67.2	9.5
	2		Uncertain	25	116 ～ 125 (121)	21 ～ 30 (28)	66.9	8.9
	3		Uncertain	25	126 ～ 135 (131)	28 ～ 32 (29)	65.1	11.0
	4		Uncertain	25	135 ～ 166 (143)	28 ～ 32 (30)	63.0	12.3
	5		Uncertain	25	83 ～ 158 (125)	25 ～ 31 (28)	66.0	12.5
Sea bass *Lateolabrax japonicus* (Tokyo Bay)	1	August, 2010	Mixed	2	1,900 ～ 2,000 (1,950)	51.8～ 52.2 (52.0)	75.5	4.7
	2		Mixed	3	1,406 ～ 1,642 (1,493)	44.2～ 46.0 (45.0)	74.7	3.2
	3		Mixed	3	1,308 ～ 1,396 (1,341)	48.4～ 50.8 (43.5)	75.8	2.9
	4		Mixed	4	1,093 ～ 1,261 (1,153)	42.8～ 44.4 (43.6)	75.3	2.8
	5		Mixed	5	990 ～ 1,086 (1,025)	39.0～ 44.2 (40.9)	75.6	2.7
Sea bass *Lateolabrax japonicus* (Kawasaki Port)	1	October, 2010	Male	12	352 ～ 409 (391)	26.5～ 31.6 (30.0)	71.8 (Av)	3.7 (Av)
	2		Male	11	410 ～ 450 (434)	31.0～ 33.5 (31.6)		
	3		Male	9	450 ～ 600 (524)	31.5～ 36.0 (33.8)		
	4		Female	11	345 ～ 675 (416)	27.5～ 35.0 (29.6)		
	5		Female	10	360 ～ 768 (466)	29.5～ 39.6 (32.0)		
Striped mullet *Mugil cephalus* (Nagoya Port)	1	August, 2010	Uncertain	5	1,182 ～ 1,224 (1,182)	38.7～ 41.6 (40.1)	72.6 (Av)	4.0 (Av)
	2		Uncertain	5	1,073 ～ 1,101 (1,085)	38.3～ 40.5 (39.6)		
	3		Uncertain	5	1,014 ～ 1,062 (1,044)	38.8～ 40.0 (39.3)		
	4		Uncertain	5	952 ～ 1,011 (973)	37.5～ 38.5 (38.0)		
	5		Uncertain	5	839 ～ 894 (874)	36.0～ 37.5 (36.7)		
Dace *Tribolodon hakonensis* (Lake Biwa, Riv. Azumi)	1	April, 2010	Female	21	247 ～ 470 (314)	25.0～ 30.0 (26.4)	70.8	4.0
	2		Male	25	215 ～ 321 (271)	24.1～ 29.0 (26.0)	68.7	4.2
	3		Female	22	273 ～ 453 (330)	24.8～ 29.0 (26.8)	68.9	4.5
	4		Male	24	188 ～ 338 (250)	23.5～ 27.6 (25.4)	70.1	4.0
	5		Female	20	253 ～ 313 (279)	24.8～ 27.6 (25.8)	69.6	3.8
Sea bass *Lateolabrax japonicus* (Osaka Bay)	1	August, 2010	Uncertain	7	682.2～ 816.3 (767.0)	37.0～ 38.0 (37.6)	74.8 (Av)	3.9 (Av)
	2		Uncertain	8	553.5～ 733.0 (674.1)	33.0～ 36.0 (34.9)		
	3		Uncertain	5	789.7～ 916.1 (862.1)	38.0～ 38.5 (38.2)		
	4		Uncertain	6	644.6～ 770.7 (734.1)	34.0～ 37.0 (35.6)		
	5		Uncertain	7	500.8～ 657.1 (611.1)	30.5～ 35.0 (32.6)		

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, 2010	Male	2	1,642 ～ 1,938 (1,790)	47.5～ 49.0 (48.3)	72.7 (Av)	3.9 (Av)
	2		Male	2	1,962 ～ 2,074 (2,018)	49.0～ 49.5 (49.1)		
	3		Male	2	1,842 ～ 1,873 (1,858)	49.5～ 50.0 (49.8)		
	4		Male	2	1,985 ～ 2,001 (1,993)	50.0～ 50.5 (50.3)		
	5		Male	2	2,059 ～ 2,262 (2,161)	52.0～ 52.5 (52.3)		
Sea bass *Lateolabrax japonicus* (Nakaumi)	1	October, 2010	Female	9	790 ～ 1,170 (929)	40.2～ 47.2 (42.7)	79.2	1.3
	2		Mixed	11	717 ～ 845 (778)	38.0～ 40.5 (39.0)	77.8	1.7
	3		Mixed	12	595 ～ 760 (689)	35.4～ 39.7 (37.8)	78.7	1.1
	4		Mixed	14	440 ～ 690 (527)	32.5～ 39.2 (34.3)	79.0	1.1
	5		Mixed	16	430 ～ 560 (486)	30.1～ 34.8 (32.9)	79.0	1.1
Sea bass *Lateolabrax japonicus* (Hiroshima Bay)	1	November, 2010	Female	6	624 ～ 763 (697)	35 ～ 38 (37)	77.4	1.4
	2		Female	8	444 ～ 586 (499)	30 ～ 35 (32)	78.0	1.2
	3		Female	7	432 ～ 608 (514)	30 ～ 35 (32)	78.1	1.4
	4		Male	7	447 ～ 628 (536)	32 ～ 37 (34)	77.6	1.5
	5		Male	7	425 ～ 631 (521)	31 ～ 35 (34)	77.6	1.4
Sea bass *Lateolabrax japonicus* (Mouth of Riv. Shimanto)	1	October, 2010	Mixed	8	322 ～ 495 (398)	25.4～ 29.1 (27.3)	75.8	1.1
	2		Mixed	10	92 ～ 410 (318)	18.0～ 27.1 (25.2)	76.2	0.9
	3		Mixed	10	229 ～ 381 (316)	22.5～ 26.8 (25.4)	76.4	1.3
	4		Mixed	11	134 ～ 372 (292)	19.2～ 27.3 (24.9)	75.8	1.0
	5		Mixed	40	39 ～ 115 (82)	12.9～ 18.8 (16.0)	77.6	0.9
Sea bass *Lateolabrax japonicus* (Mouth of Riv. Oita(Oita City))	1	November, 2010	Uncertain	1	2,595	57.2	66.1	1.8
	2		Uncertain	2	1,852 ～ 1,876 (1,864)	54.0～ 57.0 (55.5)	70.1	2.2
	3		Uncertain	2	1,679 ～ 1,891 (1,785)	52.8～ 53.8 (53.3)	69.1	2.4
	4		Uncertain	2	1,638 ～ 1,915 (1,777)	52.0～ 52.5 (52.3)	71.1	1.7
	5		Uncertain	2	1,554 ～ 1,850 (1,702)	51.5～ 53.1 (52.3)	70.6	1.8
Sea bass *Lateolabrax japonicus* (West Coast of Satsuma Peninsula)	1	November, 2010	Male	5	738.4～ 860.2 (787.2)	34.0～ 35.0 (34.5)	75.7	2.2
	2		Female	6	681.3～ 817.8 (750.6)	33.5～ 34.5 (33.9)	76.1	1.8
	3		Female	6	572.0～ 714.7 (638.3)	32.0～ 33.0 (32.6)	76.3	1.8
	4		Male	6	611.8～ 658.5 (636.0)	31.5～ 32.5 (31.8)	75.4	2.1
	5		Male	6	561.6～ 634.6 (607.3)	30.5～ 31.5 (31.1)	75.7	2.0
Okinawa seabeam *Acanthopagrus sivicolus* (Nakagusuku Bay)	1	December, 2010	Female	3	760 ～ 1,160 (1,000)	28.5～ 32.5 (30.7)	77	1.5
	2		Female	3	960 ～ 980 (973)	30.0～ 31.0 (30.5)	78	1.4
	3		Female	3	840 ～ 1,300 (1,107)	30.5～ 35.0 (32.7)	70	1.3
	4		Male	4	580 ～ 1,000 (770)	28.0～ 32.0 (29.6)	78	1.5
	5		Female	3	940 ～ 1,580 (1,180)	31.0～ 36.5 (33.0)	79	1.0

Table 3-3-3 Basic data of specimens (birds as wildlife) in the Environmental Monitoring in FY 2010

Bird species (Area)	No.	Sampling month	Sex	Number of animals	Weight (g) (Average)	Length (cm) (Average)	Water content %	Lipid content %
Black-taild gull *Larus crassirostris* (Kabu Is (Hachinohe City))	1	July, 2010	Mixed	82	219.2～ 502.7 (346.4)	14 ～ 30 (20)	74.2 (Av)	3.0 (Av)
	2		Mixed	40	294.8～ 625.2 (406.1)	20 ～ 27 (23)		
	3		Mixed	35	324.6～ 541.6 (425.9)	22 ～ 28 (25)		
	4		Mixed	25	323.2～ 588.7 (433.0)	23 ～ 29 (27)		
	5		Mixed	20	375.9～ 585.1 (451.5)	27 ～ 33 (30)		
Gray starling *Sturnus cineraceus* (Morioka City)	1	August, 2010	Male	55	77.0～ 115.0 (90.2)	13.5～ 14.5 (13.8)	69.4	2.9
	2		Male	66	73.0～ 100.6 (85.4)	11.0～ 14.0 (13.2)	70.6	3.3
	3		Female	55	77.1～ 102.3 (87.9)	13.0～ 14.3 (13.7)	69.1	3.2
	4		Female	65	69.1～ 102.3 (84.0)	12.9～ 13.5 (13.2)	70.0	3.1
	5		Uncertain	59	77.8～ 115.2 (88.2)	12.9～ 14.4 (13.6)	70.4	3.3

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

4. Summary of monitoring results

The detection ranges are shown in Table 3-4, and the detection limits are shown in Table 3-5.

The monitoring results in FY 2010 were statistically analyzed together with the previous monitoring results, accumulated over the past 9 years (or 8 years) as a result of successive measurements at the same site or area from FY 2002 (FY 2003 for some substances and media), in order to detect inter-annual trends of increase or decrease over the 9 years (or 8 years). The results of the analyses are shown in Table 3-6

Additionally, the scope of monitoring for bioaccumulate in avian biologicals (birds) was adjusted as of the FY 2010 program to include additions of target substances listed under the Stockholm Convention. Target samplings taken from black tailed gulls and starlings were reduced from five to one each. In considering that the subsequent reduction in available data could negatively impact the tracking of changes, these two species were excluded from the statistical analysis for the present fiscal year. Table3-6 summarizes year by year findings.

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

・For surface water

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

・For air

At each monitored site, the first sampling was for the monitoring in the warm season (August 30, 2010～October 27, 2010) and the second was for that in the cold season (Novemver 7, 2010～January 7, 2011).

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

○Method for regression analysis and testing

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

Assessments done in past years applied nonparametric analysis to findings that diverged from norm. However, since such methods cannot support quantitative analysis, the procedures were deemed inadequate to properly track year by year changes. Therefore, as a means of evaluation that could be appropriately applied to findings out of the norm, regression lines with maximum probability estimates were used to analyze and track year by year changes, with boot strap methods being applied to test the mean differences.

(1) For successive samplings taken from the same point: if, in any fiscal year, concentrations in one-third or more samples failed to reach detectible limits (i.e., were Non-Detected or 'nd'), it was then judged inappropriate to apply linear regression analysis to year by year changes, since the most frequent findings came below detection limits. Therefore, year by year trend analysis is provided only when less than one third of the samples show "nd" or non-detected readings.

(2) In the inter-annual trend analyses, the increase or decrease was evaluated by examining a slope obtained from simple linear regression analysis (simple log-linear regression model). To obtain the proper regression line, the line was selected using methods to maximize the product of the probability density of each measured value according to the distribution of population obtained by each measurement result (maximum likelihood estimation). Where the total of samples at each point differed from others, the data were weighted so that the overall impact of data from different points was leveled. Also, the agreement between the linear regression model (primary expression) results and measurement results was evaluated in accord with Akaike's Information Criterion (AIC). AICs were calculated for both "slope model (simple log-linear regression model)" and "non-slope model

(residuals from the mean value model)". These AIC data were used to calculate posteriori probability. When probability was 95% or greater, measurement results were deemed to be in agreement with the simple log-linear regression model.

(3) When agreement was found as per (2) above, concentrations were deemed to sufficient to demonstrate inter-annual increase or decrease trends, based on the (positive or negative) slope of the regression line obtained via (1) above. The results are indicated as " ↘ " or " ↗ " in Table 3-6.

(4) As addressed in (1) above, where concentrations found in one third or more samples failed to demonstrate detection, (i.e., were 'nd'), linear regression analysis was deemed inappropriate to track year by year changes. Instead, we employed mean difference derived using the boot strap method. This method helps verify differences in mean distribution between two samples obtained from repeated calculations of mean values of randomly extracted data for these samples. This method was employed in the initial half-period period (FY 2002 – FY 2006) and the second-half period (FY2008 - 2010) for results where more than 50% of samples failed to evidence detection (nd) in any fiscal year.

(5) The second-half period indicated a lower concentration when it was deemed by the testing of differences in average values using the boot strap method (p-value: more than 5%) that there is a significant difference between the first-half and second-half periods and the average concentration in the second-half period was lower than the first half. These results are indicated as " ¯|_ " (or" _|¯ ") in Table 3-6.

When findings did not clearly demonstrate a year by year or inter-annual decrease (or increase) in (3), or when there was no difference in (5), this is indicated in Table 3-6 as "—." When concentrations found in 50% or more samples failed to demonstrate detection, (i.e., were nd), this is indicated as "X" in Table 3-6 because that method is insufficient to analyze year by year trends.

Table 3-4-1 List of the detection ranges in the Environmental Monitoring in FY 2010 (Part 1)

No.	Target chemicals	Surface water（pg/L）		Sediment（pg/g-dry）	
		Renge (Frepuency)	Av.	Renge (Frepuency)	Av.
[1]	PCBs	nd～2,200 (41/49)	120	nd～710,000 (56/64)	6,500
[2]	HCB	nd～120 (39/49)	tr(10)	4～21,000 (64/64)	130
[3]	Aldrin (reference)				
[4]	Dieldrin (reference)				
[5]	Endrin (reference)				
[6]	DDTs	8.0～11,000 (49/49)	46	42～330,000 (64/64)	1,900
	[6-1] p,p'-DDT	tr(1.0)～7,500 (49/49)	8.5	9.3～220,000 (64/64)	230
	[6-2] p,p'-DDE	2.4～1,600 (49/49)	14	11～40,000 (64/64)	680
	[6-3] p,p'-DDD	1.6～970 (49/49)	12	4.4～78,000 (64/64)	510
	[6-4] o,p'-DDT	nd～700 (43/49)	1.5	1.4～13,000 (64/64)	40
	[6-5] o,p'-DDE	tr(0.13)～180 (49/49)	0.97	tr(0.7)～25,000 (64/64)	37
	[6-6] o,p'-DDD	tr(0.5)～170 (49/49)	4.6	tr(0.8)～6,900 (64/64)	130
[7]	Chlordanes	nd～540 (44/49)	52	tr(14)～25,000 (64/64)	320
	[7-1] cis-chlordane	nd～170 (47/49)	19	tr(4)～7,200 (64/64)	82
	[7-2] trans-chlordane	nd～310 (44/49)	15	tr(4)～8,000 (64/64)	95
	[7-3] Oxychlordane	nd～45 (47/49)	1.5	nd～60 (56/64)	1.7
	[7-4] cis-Nonachlor	tr(0.9)～40 (49/49)	5.4	2.3～3,600 (64/64)	53
	[7-5] trans-Nonachlor	nd～93 (45/49)	12	tr(3)～6,200 (64/64)	80
[8]	Heptachlors	nd～760 (44/49)	5.8	nd～340 (45/64)	tr(4.4)
	[8-1] heptachlor	nd～43 (4/49)	nd	nd～35 (51/64)	1.2
	[8-2] cis-heptachlor epoxide	0.7～710 (49/49)	5.9	nd～300 (62/64)	3.1
	[8-3] trans-heptachlor epoxide	nd～8.0 (2/49)	nd	nd～4 (1/64)	nd
[9]	Toxaphenes (reference)				
	[9-1] Parlar-26 (reference)				
	[9-2] Parlar-50 (reference)				
	[9-3] Parlar-62 (reference)				
[10]	Mirex (reference)				
[11]	HCHs				
	[11-1] α-HCH	14～1,400 (49/49)	94	3.1～3,700 (64/64)	140
	[11-2] β-HCH	33～2,500 (49/49)	180	11～8,200 (64/64)	230
	[11-3] γ-HCH （synonym:Lindane）	tr(5)～190 (49/49)	26	tr(1.5)～2,300 (64/64)	35
	[11-4] δ-HCH	0.9～780 (49/49)	16	1.3～3,800 (64/64)	39

(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 3-4-2 List of the detection ranges in the Environmental Monitoring in FY 2010 (Part 2)

No.	Target chemicals	Surface water（pg/L）		Sediment（pg/g-dry）	
		Renge (Frepuency)	Av.	Renge (Frepuency)	Av.
[12]	Chlordecone	nd～1.6 (13/49)	tr(0.04)	nd～2.8 (9/64)	nd
[13]	Hexabromobiphenyls	nd (0/49)	nd	nd～18 (10/64)	nd
[14]	Polybromodiphenyl ethers(Br4～Br10)	nd～14,000 (31/49)	tr(270)	nd～730,000 (60/64)	5,800
	[14-1] Tetrabromodiphenyl ethers	nd～390 (17/49)	nd	nd～910 (57/64)	35
	[14-2] Pentabromodiphenyl ethers	nd～130 (25/49)	tr(1)	nd～740 (58/64)	26
	[14-3] Hexabromodiphenyl ethers	nd～51 (16/49)	nd	nd～770 (57/64)	23
	[14-4] Heptabromodiphenyl ethers	nd～14 (17/49)	nd	nd～930 (58/64)	28
	[14-5] Octabromodiphenyl ethers	nd～69 (40/49)	tr(2)	nd～1,800 (60/64)	71
	[14-6] Nonabromodiphenyl ethers	nd～620 (39/49)	tr(17)	nd～26,000 (60/64)	360
	[14-7] Decabromodiphenyl ether	nd～13,000 (31/49)	tr(250)	nd～700,000 (60/64)	5,100
[15]	Perfluorooctane sulfonic acid (PFOS)	tr(37)～230,000 (49/49)	490	tr(3)～1,700 (64/64)	82
[16]	Perfluorooctanoic acid (PFOA)	190～23,000 (49/49)	2,700	nd～180 (62/64)	28
[17]	Pentachlorobenzene	tr(1)～100 (49/49)	8	1.0～4,200 (64/64)	90
[18]	*N,N′*-Diphenyl-*p*-phenylenediamines				
	[18-1] *N,N′*-Diphenyl-*p*-phenylenediamine				
	[18-2] *N,N′*-Ditolyl-*p*-phenylenediamine				
	[18-3] *N,N′*-Dixylyl-*p*-phenylenediamine				
[19]	Tributyltin compounds	nd～1,600 (12/49)	nd	nd～1,300,000 (53/64)	2,500
[20]	Triphenyltin compounds	nd～250 (4/49)	nd	nd～210,000 (42/64)	290

(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) [grey box] means the medium was not monitored.

(Note 4) The target chemicals of the Perfluorooctane sulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) monitoring survey were n-Perfluorooctane sulfonic acid and n-Perfluorooctanoic acid.

Table 3-4-3 List of the detection ranges in the Environmental Monitoring in FY 2010 (Part 3)

No.	Target chemicals	Wildlife（pg/g-wet）						Air（pg/m^3）			
		Bibalves		Fish		Birds		First (Warm season)		Second (Cold season)	
		Renge (Frepuency)	Av.	Renge (Frepuency)	Av.	Renge (Frepuency)	Av.	Renge (Frepuency)	Av.	Renge (Frepuency)	Av.
[1]	PCBs	1,500～46,000 (6/6)	9,200	880～260,000 (18/18)	13,000	6,600～9,100 (2/2)	7,700	36～970 (35/35)	160	19～630 (35/35)	84
[2]	HCB	tr(4)～210 (6/6)	34	36～1,700 (18/18)	240	500～1,900 (2/2)	970	73～160 (37/37)	120	56～380 (37/37)	100
[3]	Aldrin (reference)										
[4]	Dieldrin (reference)										
[5]	Endrin (reference)										
[6]	DDTs	460～7,400 (6/6)	1,800	360～19,000 (18/18)	3,600	6,400～160,000 (2/2)	32,000	1.0～290 (37/37)	12	1.4～41 (37/37)	4.9
	[6-1] *p,p'*-DDT	43～470 (6/6)	180	7～2,100 (18/18)	240	nd～15 (1/2)	3	0.28～56 (37/37)	3.5	0.30～16 (37/37)	1.3
	[6-2] *p,p'*-DDE	230～6,300 (6/6)	1,100	260～13,000 (18/18)	2,300	6,300～160,000 (2/2)	32,000	tr(0.41)～200 (37/37)	4.9	tr(0.47)～28 (37/37)	2.2
	[6-3] *p,p'*-DDD	11～960 (6/6)	180	57～2,900 (18/18)	560	120～1,600 (2/2)	440	0.04～1.7 (37/37)	0.20	0.02～0.41 (37/37)	0.10
	[6-4] *o,p'*-DDT	15～160 (6/6)	51	5～550 (18/18)	58	nd (0/2)	nd	0.19～26 (37/37)	2.2	0.22～5.5 (37/37)	0.81
	[6-5] *o,p'*-DDE	7.8～160 (6/6)	46	tr(1.2)～2,800 (18/18)	47	nd～3.7 (1/2)	tr(1.1)	0.09～9.0 (37/37)	0.49	0.08～2.3 (37/37)	0.27
	[6-6] *o,p'*-DDD	5.8～400 (6/6)	57	2.6～700 (18/18)	75	3.6～11 (2/2)	6.3	0.04～1.8 (37/37)	0.21	tr(0.02)～0.48 (37/37)	0.10
[7]	Chlordanes	230～31,000 (6/6)	3,900	230～11,000 (18/18)	1,900	860～1,600 (2/2)	1,200	6.6～2,100 (37/37)	210	tr(2.9)～380 (37/37)	63
	[7-1] *cis*-chlordane	67～15,000 (6/6)	1,600	51～3,400 (18/18)	450	4～180 (2/2)	27	2.2～700 (37/37)	68	tr(0.8)～130 (37/37)	20
	[7-2] *trans*-chlordane	31～5,500 (6/6)	520	9～1,100 (18/18)	120	tr(2)～10 (2/2)	4	2.0～820 (37/37)	79	tr(1.0)～150 (37/37)	24
	[7-3] Oxychlordane	11～3,300 (6/6)	240	33～1,000 (18/18)	120	320～510 (2/2)	400	0.44～6.2 (37/37)	1.5	0.26～2.3 (37/37)	0.56
	[7-4] *cis*-Nonachlor	35～1,300 (6/6)	280	23～2,200 (18/18)	320	57～190 (2/2)	100	0.23～68 (37/37)	7.5	tr(0.06)～13 (37/37)	1.8
	[7-5] *trans*-Nonachlor	84～6,000 (6/6)	790	110～4,700 (18/18)	800	290～880 (2/2)	510	1.7～520 (37/37)	52	tr(0.7)～89 (37/37)	15
[8]	Heptachlors	10～1,900 (6/6)	180	tr(6.0)～230 (18/18)	41	240～360 (2/2)	290	1.4～170 (37/37)	21	0.73～53 (37/37)	8.7
	[8-1] heptachlor	nd～78 (5/6)	3	nd～5 (12/18)	tr(2)	nd～tr(1) (1/2)	nd	0.69～160 (37/37)	17	0.22～53 (37/37)	7.2
	[8-2] *cis*-heptachlor epoxide	9.0～1,800 (6/6)	170	5.0～230 (18/18)	39	240～360 (2/2)	290	0.38～10 (37/37)	2.3	0.33～4.3 (37/37)	0.93
	[8-3] *trans*-heptachlor epoxide	nd～24 (3/6)	3	nd (0/18)	nd	nd (0/2)	nd	nd～0.16 (6/37)	nd	nd (0/37)	nd
[9]	Toxaphenes (reference)										
	[9-1] Parlar-26 (reference)										
	[9-2] Parlar-50 (reference)										
	[9-3] Parlar-62 (reference)										
[10]	Mirex(reference)										
[11]	HCHs										
	[11-1] *α*-HCH	13～730 (6/6)	35	tr(1)～250 (18/18)	27	160～430 (2/2)	260	14～280 (37/37)	46	6.8～410 (37/37)	19
	[11-2] *β*-HCH	27～1,500 (6/6)	89	5～760 (18/18)	81	910～2,800 (2/2)	1,600	0.89～34 (37/37)	5.6	tr(0.26)～29 (37/37)	1.7
	[11-3] *γ*-HCH (synonym:Lindane)	5～150 (6/6)	14	tr(1)～56 (18/18)	9	4～23 (2/2)	10	2.3～66 (37/37)	14	1.1～60 (37/37)	4.8
	[11-4] *δ*-HCH	nd～870 (5/6)	4	nd～36 (13/18)	tr(2)	11～13 (2/2)	12	0.11～25 (37/37)	1.4	0.05～22 (37/37)	0.38

(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 3-4-4 List of the detection ranges in the Environmental Monitoring in FY 2010 (Part 4)

No.	Target chemicals	Wildlife (pg/g-wet)						Air (pg/m³)			
		Bibalves		Fish		Birds		First (Warm season)		Second (Cold season)	
		Renge (Frepuency)	Av.	Renge (Frepuency)	Av.	Renge (Frepuency)	Av.	Renge (Frepuency)	Av.	Renge (Frepuency)	Av.
[12]	Chlordecone	nd (0/6)	nd	nd (0/18)	nd	nd (0/2)	nd	nd (0/37)	nd	nd (0/37)	nd
[13]	Hexabromobiphenyls	nd (0/6)	nd	nd (0/18)	nd	nd (0/2)	nd	nd (0/37)	nd	nd (0/37)	nd
[14]	Polybromodiphenyl ethers(Br4～Br10)	nd～610 (3/6)	tr(160)	nd～1,200 (12/18)	tr(300)	460～660 (2/2)	550	nd～330 (16/37)	nd	nd～120 (22/37)	tr(14)
	[14-1] Tetrabromodiphenyl ethers	nd～310 (5/6)	59	tr(16)～740 (18/18)	160	72～270 (2/2)	140	0.15～50 (37/37)	0.79	tr(0.09)～25 (37/37)	0.40
	[14-2] Pentabromodiphenyl ethers	tr(9)～98 (6/6)	32	nd～200 (16/18)	51	120～200 (2/2)	150	nd～45 (35/37)	0.20	nd～28 (34/37)	0.20
	[14-3] Hexabromodiphenyl ethers	nd～26 (4/6)	8	nd～400 (16/18)	39	86～140 (2/2)	110	nd～4.9 (29/37)	tr(0.14)	nd～5.4 (31/37)	0.24
	[14-4] Heptabromodiphenyl ethers	nd～tr(10) (1/6)	nd	nd～40 (4/18)	nd	nd～70 (1/2)	tr(19)	nd～1.4 (24/37)	tr(0.2)	nd～11 (28/37)	0.3
	[14-5] Octabromodiphenyl ethers	nd～tr(10) (2/6)	nd	nd～100 (8/18)	tr(6)	26～65 (2/2)	41	nd～2.3 (30/37)	0.25	nd～6.9 (32/37)	0.40
	[14-6] Nonabromodiphenyl ethers	nd～60 (5/6)	tr(16)	nd～40 (3/18)	nd	tr(20)～50 (2/2)	32	nd～24 (12/37)	nd	nd～7.1 (22/37)	tr(1.2)
	[14-7] Decabromodiphenyl ether	nd～tr(190) (2/6)	nd	nd～tr(150) (2/18)	nd	nd (0/2)	nd	nd～290 (10/37)	nd	nd～88 (21/37)	tr(11)
[15]	Perfluorooctane sulfonic acid (PFOS)	nd～680 (5/6)	72	nd～15,000 (17/18)	390	580～3,000 (2/2)	1,300	1.6～14 (37/37)	5.2	1.4～15 (37/37)	4.7
[16]	Perfluorooctanoic acid (PFOA)	nd～76 (5/6)	28	nd～95 (13/18)	tr(13)	30～48 (2/2)	38	4.0～210 (37/37)	25	2.4～130 (37/37)	14
[17]	Pentachlorobenzene	5.9～110 (6/6)	18	5.6～230 (18/18)	42	49～170 (2/2)	91	36～140 (37/37)	68	37～180 (37/37)	70
[18]	*N,N′*-Diphenyl-*p*-phenylenediamines [18-1] *N,N′*-Diphenyl-*p*-phenylenediamine							nd (0/114)	nd		
	[18-2] *N,N′*-Ditolyl-*p*-phenylenediamine [18-3] *N,N′*-Dixylyl-*p*-phenylenediamine							nd (0/114)	nd		
	Tributyltin compounds							nd (0/114)	nd		
	Triphenyltin compounds							nd (0/114)	nd		
[19]	Tributyltin compounds	1,600～30,000 (6/6)	6,400	nd～23,000 (17/18)	1,100	nd (0/2)	nd				
[20]	Triphenyltin compounds	490～6,500 (6/6)	1,700	tr(140)～14,000 (18/18)	2,300	nd～tr(120) (1/2)	nd				

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

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

(Note 3) [grey box] means the medium was not monitored.

(Note 4) The target chemicals of the Perfluorooctane sulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) monitoring survey were n-Perfluorooctane sulfonic acid and n-Perfluorooctanoic acid. However, the possibility cannot be ruled out that the concentration of branched Perfluorooctanoic acid, which has a branched carbon chain, was included in measured concentration as n-Perfluorooctanoic acid in a survey of wildlife.

Table 3-5-1 List of the quantification [detection] limits in the Environmental Monitoring in FY 2010 (Part 1)

No.	Target chemicals	Surface water (pg/L)	Sediment (pg/g-dry)	Wildlife (pg/g-wet)	Air (pg/m³)
[1]	PCBs	※73 [※24]	※660 [※220]	※52 [※20]	※7.3 [※2.5]
[2]	HCB	13 [4]	3 [1]	5 [2]	1.8 [0.7]
[3]	Aldrin (reference)				
[4]	Dieldrin (reference)				
[5]	Endrin (reference)				
[6]	DDTs	※7.2 [※2.5]	※12 [※4.7]	※12 [※4.3]	※0.95 [※0.32]
	[6-1] *p,p'*-DDT	2.4 [0.8]	2.8 [0.9]	3 [1]	0.10 [0.03]
	[6-2] *p,p'*-DDE	2.3 [0.8]	5 [2]	3 [1]	0.62 [0.21]
	[6-3] *p,p'*-DDD	0.20 [0.08]	1.4 [0.5]	1.3 [0.5]	0.02 [0.01]
	[6-4] *o,p'*-DDT	1.5 [0.5]	1.1 [0.4]	3 [1]	0.14 [0.05]
	[6-5] *o,p'*-DDE	0.24 [0.09]	1.2 [0.5]	1.5 [0.6]	0.04 [0.01]
	[6-6] *o,p'*-DDD	0.6 [0.2]	0.9 [0.4]	0.6 [0.2]	0.03 [0.01]
[7]	Chlordanes	※34 [※12]	※25 [※8.7]	※22 [※9]	※3.0 [※1.0]
	[7-1] *cis*-chlordane	11 [4]	6 [2]	4 [2]	0.9 [0.3]
	[7-2] *trans*-chlordane	13 [4]	11 [4]	3 [1]	1.2 [0.4]
	[7-3] Oxychlordane	0.7 [0.3]	1.0 [0.4]	8 [3]	0.03 [0.01]
	[7-4] *cis*-Nonachlor	1.3 [0.4]	0.9 [0.3]	3 [1]	0.11 [0.04]
	[7-5] *trans*-Nonachlor	8 [3]	6 [2]	4 [2]	0.8 [0.3]
[8]	Heptachlors	※3.9 [※1.4]	※4.9 [※1.7]	※8.4 [※2.9]	※0.29 [※0.11]
	[8-1] heptachlor	2.2 [0.7]	1.1 [0.4]	3 [1]	0.11 [0.04]
	[8-2] *cis*-heptachlor epoxide	0.4 [0.2]	0.8 [0.3]	2.4 [0.9]	0.02 [0.01]
	[8-3] *trans*-heptachlor epoxide	1.3 [0.5]	3 [1]	3 [1]	0.16 [0.06]
[9]	Toxaphenes (reference)				
	[9-1] Parlar-26 (reference)				
	[9-2] Parlar-50 (reference)				
	[9-3] Parlar-62 (reference)				
[10]	Mirex(reference)				
[11]	HCHs				
	[11-1] *α*-HCH	4 [1]	2.0 [0.8]	3 [1]	1.4 [0.47]
	[11-2] *β*-HCH	2.0 [0.7]	2.4 [0.8]	3 [1]	0.27 [0.09]
	[11-3] *γ*-HCH (synonym:Lindane)	6 [2]	2.0 [0.7]	3 [1]	0.35 [0.12]
	[11-4] *δ*-HCH	0.8 [0.3]	1.2 [0.5]	3 [1]	0.05 [0.02]

(Note 1) Each quantification limit is shown above the corresponding [detection limit].
(Note 2) " * " means the quantification [detection] limit is the sum value of congeners.
(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.
(Note 5) ▒ means the medium was not monitored.

Table 3-5-1 List of the quantification [detection] limits in the Environmental Monitoring in FY 2010 (Part 2)

No.	Target chemicals	Surface water（pg/L）	Sediment（pg/g-dry）	Wildlife（pg/g-wet）	Air（pg/m^3）
[12]	Chlordecone	0.09 [0.04]	0.4 [0.2]	5.9 [2.3]	0.04 [0.02]
[13]	Hexabromobiphenyls	3 [1]	1.5 [0.6]	※24 [※10]	0.3 [0.1]
[14]	Polybromodiphenyl ethers(Br4～Br10)	※340 [※110]	※270 [※100]	※400 [※150]	※32 [※11]
	[14-1] Tetrabromodiphenyl ethers	9 [3]	6 [2]	43 [16]	0.12 [0.05]
	[14-2] Pentabromodiphenyl ethers	3 [1]	5 [2]	14 [6]	0.12 [0.05]
	[14-3] Hexabromodiphenyl ethers	4 [2]	4 [2]	8 [3]	0.16 [0.06]
	[14-4] Heptabromodiphenyl ethers	3 [1]	4 [2]	30 [10]	0.3 [0.1]
	[14-5] Octabromodiphenyl ethers	3 [1]	10 [4]	11 [4]	0.15 [0.06]
	[14-6] Nonabromodiphenyl ethers	21 [7]	24 [9]	30 [10]	3.7 [1.2]
	[14-7] Decabromodiphenyl ether	300 [100]	220 [80]	270 [97]	27 [9.1]
[15]	Perfluorooctane sulfonic acid (PFOS)	50 [20]	5 [2]	25 [9.6]	0.4 [0.1]
[16]	Perfluorooctanoic acid (PFOA)	60 [20]	12 [5]	26 [9.9]	0.5 [0.2]
[17]	Pentachlorobenzene	4 [1]	0.9 [0.3]	1.9 [0.7]	1.2 [0.5]
[18]	*N,N′*-Diphenyl-*p*-phenylenediamines [18-1] *N,N′*-Diphenyl-*p*-phenylenediamine				
	[18-2] *N,N′*-Ditolyl-*p*-phenylenediamine [18-3] *N,N′*-Dixylyl-*p*-phenylenediamine				1.4 [0.34]
	Tributyltin compounds				1.5 [0.51]
	Triphenyltin compounds				1.4 [0.34]
[19]	Tributyltin compounds	200 [100]	160 [80]	420 [160]	
[20]	Triphenyltin compounds	120 [50]	70 [30]	270 [110]	

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

Table 3-6-1 Results of inter-annual trend analysis from FY2002 to FY2010 (surface water)

No	Name	Surface water				
			River area	Lake area	Mouth area	Sea area
[1]	PCBs	↘	↘	↘	↘	—
[2]	HCB	↘	↘	—	↘	¯L
[3]	Aldrin (reference)					
[4]	Dieldrin (reference)					
[5]	Endrin (reference)					
[6]	DDTs					
	[6-1] *p,p'*-DDT	—	—	↘	—	—
	[6-2] *p,p'*-DDE	—	↘	—	↘	—
	[6-3] *p,p'*-DDD	—	—	—	—	—
	[6-4] *o,p'*-DDT	↘	↘	↘	↘	¯L
	[6-5] *o,p'*-DDE	¯L	X	—	—	¯L
	[6-6] *o,p'*-DDD	—	—	—	↘	—
[7]	Chlordanes					
	[7-1] *cis*-chlordane	↘	↘	—	↘	↘
	[7-2] *trans*-chlordane	↘	—	—	—	↘
	[7-3] Oxychlordane	X	—*	X	—	X
	[7-4] *cis*-Nonachlor	—	—	—	—	—
	[7-5] *trans*-Nonachlor	↘	—	—	—	↘
[8]	Heptachlors					
	[8-1] heptachlor	X	X	X	X	X
	[8-2] *cis*-heptachlor epoxide	—	—	—	↘	↘
	[8-3] *trans*-heptachlor epoxide	X	X	X	X	X
[9]	Toxaphenes (reference)					
	[9-1] Parlar-26 (reference)					
	[9-2] Parlar-50 (reference)					
	[9-3] Parlar-62 (reference)					
[10]	Mirex(reference)					
[11]	HCHs					
	[11-1] α-HCH	—	—	—	—	—
	[11-2] β-HCH	—	—	↘	—	—
	[11-3] γ-HCH (synonym:Lindane)	↘	↘	—	↘	↘
	[11-4] δ-HCH	—*	—	—	X	X

(Note 1) When the posteriori probability from AICs was more than 95%, the measurement results were deemed to be in agreement with the simple log-linear regression model.

(Note 2) " ↘ ": An inter-annual trend of decrease was found.

" ¯L ": Statistically significant differences between the first-half and second-half periods were found.

"—": An inter-annual trend was not found.

"X": This analysis approach was regarded as unsuitable because "measured concentrations of more than 50% of samples did not reach the detection limit (nd) in an FY or more," "measured concentrations did not show a normal distribution in an FY or more," "the number of samples was less than 10 in each FY," or "measured concentrations did not show a homoscedasticity in an FY or more."

(Note 3) The classification of monitored sites with area are shown in Table 3-7

Table 3-6-2 Results of inter-annual trend analysis from FY2002 to FY2010 (sediment)

No	Name	Sediment				
			River area	Lake area	Mouth area	Sea area
[1]	PCBs	—	—＊	—	—	—
[2]	HCB	—	—	—	—	—
[3]	Aldrin (reference)					
[4]	Dieldrin (reference)					
[5]	Endrin (reference)					
[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	—＊	—	X	—＊	X
	[7-4] *cis*-Nonachlor	—	—	—	—	↘
	[7-5] *trans*-Nonachlor	—	—	—	—	↘
[8]	Heptachlors					
	[8-1] heptachlor	X	X	X	¯L	X
	[8-2] *cis*-heptachlor epoxide	¯L	—＊	—	↘	X
	[8-3] *trans*-heptachlor epoxide	X	X	X	X	X
[9]	Toxaphenes (reference)					
	[9-1] Parlar-26 (reference)					
	[9-2] Parlar-50 (reference)					
	[9-3] Parlar-62 (reference)					
[10]	Mirex(reference)					
[11]	HCHs					
	[11-1] *α*-HCH	—	—	—	—	—
	[11-2] *β*-HCH	—	—	↘	—	—
	[11-3] *γ*-HCH (synonym:Lindane)	—	—	↘	—	—
	[11-4] *δ*-HCH	—	—	—	—	—

(Note 1) When the posteriori probability from AICs was more than 95%, the measurement results were deemed to be in agreement with the simple log-linear regression model.

(Note 2) "↘": An inter-annual trend of decrease was found.

"¯L": Statistically significant differences between the first-half and second-half periods were found.

"—": An inter-annual trend was not found.

"X": This analysis approach was regarded as unsuitable because "measured concentrations of more than 50% of samples did not reach the detection limit (nd) in an FY or more," "measured concentrations did not show a normal distribution in an FY or more," "the number of samples was less than 10 in each FY," or "measured concentrations did not show a homoscedasticity in an FY or more."

(Note 3) The classification of monitored sites with area are shown in Table 3-7

Table 3-6-3 Results of inter-annual trend analysis from FY2002 to FY2010 (wildlife)

No	Name	Bivalves	Fish
[1]	PCBs	↘	—
[2]	HCB	—	—
[3]	Aldrin (reference)		
[4]	Dieldrin (reference)		
[5]	Endrin (reference)		
[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	X	X
	[8-2] *cis*-heptachlor epoxide	—	—
	[8-3] *trans*-heptachlor epoxide	X	X
[9]	Toxaphenes (reference)		
	[9-1] Parlar-26 (reference)		
	[9-2] Parlar-50 (reference)		
	[9-3] Parlar-62 (reference)		
[10]	Mirex(reference)		
[11]	HCHs		
	[11-1] α-HCH	—	—
	[11-2] β-HCH	—	—
	[11-3] γ-HCH (synonym:Lindane)	↘	↘
	[11-4] δ-HCH	X	—*

(Note 1) When the posteriori probability from AICs was more than 95%, the measurement results were deemed to be in agreement with the simple log-linear regression model.

(Note 2) "↘": An inter-annual trend of decrease was found.

"⌐": Statistically significant differences between the first-half and second-half periods were found.

"—": An inter-annual trend was not found.

"X": This analysis approach was regarded as unsuitable because "measured concentrations of more than 50% of samples did not reach the detection limit (nd) in an FY or more," "measured concentrations did not show a normal distribution in an FY or more," "the number of samples was less than 10 in each FY," or "measured concentrations did not show a homoscedasticity in an FY or more."

Table 3-6-4 Results of inter-annual trend analysis from FY2002 to FY2010 (air)

No	Name	Air	
		Warm season	Cold season
[1]	PCBs	—	—
[2]	HCB	—	—
[3]	Aldrin (reference)		
[4]	Dieldrin (reference)		
[5]	Endrin (reference)		
[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	X	X
[9]	Toxaphenes (reference)		
	[9-1] Parlar-26 (reference)		
	[9-2] Parlar-50 (reference)		
	[9-3] Parlar-62 (reference)		
[10]	Mirex(reference)		

(Note 1) When the posteriori probability from AICs was more than 95%, the measurement results were deemed to be in agreement with the simple log-linear regression model.

(Note 2) " ↘ ": An inter-annual trend of decrease was found.

" ┐└ ": Statistically significant differences between the first-half and second-half periods were found.

"—": An inter-annual trend was not found.

"X": This analysis approach was regarded as unsuitable because "measured concentrations of more than 50% of samples did not reach the detection limit (nd) in an FY or more," "measured concentrations did not show a normal distribution in an FY or more," "the number of samples was less than 10 in each FY," or "measured concentrations did not show a homoscedasticity in an FY or more."

Table 3-7 The classification of monitored sites with area at inter-annual trend analysis.

Classification	Local Communities	Monitored sites	Monitored media	
			Surface water	Sediment
River area	Hokkaido	Onnenai-ohashi Bridge, Riv. Teshio(Bifuka Town)		○
		Suzuran-ohashi Bridge, Riv Tokachi(Obihiro City)	○	○
		Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City)	○	○
	Iwate Pref.	Riv. Toyosawa(Hanamaki City)	○	○
	Sendai City	Hirose-ohashi Bridge, Riv. Hirose(Sendai City)		○
	Yamagata Pref.	Mouth of Riv. Mogami(Sakata City)	○	○
	Ibaraki Pref.	Tonekamome-ohasi Bridge, Mouth of Riv. Tone (Kamisu City)	○	○
	Tochigi Pref.	Riv. Tagawa(Utsunomiya City)	○	○
	Saitama Pref.	Akigaseshusui of Riv. Arakawa	○	
	Niigata Pref.	Lower Riv. Shinano(Niigata City)	○	○
	Toyama Pref.	Hagiura-bashi Bridge, Mouth of Riv. Jintsu(Toyama City)	○	○
	Fukui Pref.	Mishima-bashi Bridge, Riv. Shono(Tsuruga City)	○	○
	Yamanashi Pref.	Senshu-bashi Bridge, Riv. Arakawa(Kofu City)		○
	Shizuoka Pref.	Riv. Tenryu(Iwata City)	○	○
	Kyoto City	Miyamae-bashi Bridge, Miyamae Bridge, Riv. Katsura (Kyoto City)	○	○
	Osaka City	Osaka Port	○	○
		Riv. Yodo(Osaka City)		○
	Nara Pref.	Riv. Yamato(Ooji Town)		○
	Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa(Wakayama City)	○	○
	Kochi Pref.	Mouth of Riv. Shimanto(Shimanto City)	○	○
	Kumamoto Pref.	Riv. Midori(Uto City)	○	
	Miyazaki Pref.	Mouth of Riv. Oyodo(Miyazaki City)	○	○
	Kagoshima Pref.	Riv. Amori(Kirishima City)	○	○
		Gotanda-bashi Bridge, Riv. Gotanda(Ichikikushikino City)	○	○
Lake area	Aomori Pref.	Lake Jusan	○	○
	Akita Pref.	Lake Hachiro	○	○
	Nagano Pref.	Lake Suwa(center)	○	○
	Shiga Pref.	Lake Biwa(center, offshore of Minamihira)		○
		Lake Biwa(center, offshore of Karasaki)	○	○
River mouth area	Hokkaido	Tomakomai Port		○
	Chiba City	Mouth of Riv. Hanami(Chiba City)	○	○
	Tokyo Met.	Mouth of Riv. Arakawa(Koto Ward)	○	○
		Mouth of Riv. Sumida(Minato Ward)	○	○
	Kawasaki City	Mouth of Riv. Tama(Kawasaki City)		○
	Ishikawa Pref.	Mouth of Riv. Sai(Kanazawa City)	○	○
	Aichi Pref.	Kinuura Port		○
	Mie Pref.	Toba Port		○
	Osaka Pref.	Mouth of Riv. Yamato(Sakai City)	○	○
	Osaka City	Mouth of Riv. Yodo(Osaka City)		○
	Tokushima Pref.	Mouth of Riv. Yoshino(Tokushima City)	○	○
	Kagawa Pref.	Takamatsu Port	○	○
	Kitakyushu City	Dokai Bay	○	○
	Oita Pref.	Mouth of Riv. Oita(Oita City)		○
	Okinawa Pref.	Naha Port	○	○
Sea area	Miyagi Pref.	Sendai Bay(Matsushima Bay)	○	○
	Fukushima Pref.	Onahama Port	○	○
	Chiba Pref.	Coast of Ichihara and Anegasaki		○
	Yokohama City	Yokohama Port	○	○
	Kawasaki City	Keihin Canal, Port of Kawasaki	○	○
	Shizuoka Pref.	Shimizu Port		○
	Aichi Pref.	Nagoya Port	○	○
	Mie Pref.	Yokkaichi Port	○	○
	Kyoto Pref.	Miyazu Port	○	○
	Osaka City	Outside Osaka Port		○
	Hyogo Pref.	Offshore of Himeji	○	○
	Kobe City	Kobe Port(center)	○	○
	Okayama Pref.	Offshore of Mizushima	○	○
	Hiroshima Pref.	Kure Port	○	○
		Hiroshima Bay	○	○
	Yamaguchi Pref.	Tokuyama Bay	○	○
		Offshore of Ube	○	○
		Offshore of Hagi	○	○
	Ehime Pref.	Niihama Port		○
	Fukuoka City	Hakata Bay		○
	Saga Pref.	Imari Bay	○	○
	Nagasaki Pref.	Omura Bay	○	○

(Note) There are monitored sites which were classified in the area unlike these names by the situations

In the wake of the monitoring surveys of FYs 2002, 2003, 2004, 2005, 2006, 2007, 2008 and 2009, FY 2010 saw a high sensitivity analysis covering five of ten POPs treaty substances and HCHs. All these chemicals were found, excepting heptachlors (*trans*-heptachlor epoxide) in wildlife (fish and birds).

A high sensitivity analysis also surveyed for Chlordecone, Hexabromobiphenyls, Polybromodiphenyl ethers (Br4~Br10), Perfluorooctane sulfonic acid (PFOS), Perfluorooctanoic acid (PFOA), Pentachlorobenzene, *N*,*N*'-Diphenyl-*p*-phenylenediamines, Tributyltin compounds and Triphenyltin compounds. All these chemicals were detected excepting Chlordecone in wildlife and in the air; Hexabromobiphenyls in surface water, wildlife and air: *N*,*N*'-Diphenyl-*p*-phenylenediamines in air: and Triphenyltin compounds in wildlife (specifically, birds).

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

[1] PCBs

・ History and state of monitoring

Polychlorinated biphenyls (PCBs) had been used as insulating oil, etc. and were designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in June 1974, since the substances are 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.

Under the framework of the Environmental Monitoring, the substances in surface water, sediment, wildlife (bivalves, fish and birds) and air have been monitored since FY 2002.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 49 sites, and it was detected at 41 of the 49 valid sites adopting the detection limit of **24pg/L, and none of the detected concentrations exceeded 2,200 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendency in specimens from river areas, lake areas, river mouth areas and sea area were identified as statistically significant and reduction tendency in specimens from the overall areas was also identified as statistically significant.

Stocktaking of the detection of PCBs (total amount) in surface water during FY2002~2010

PCBs (total amount)	Monitored year	Geometric Mean*	Median	Maximum	Minimum	Quantification [Detection] Limit**	Detection Frequency Sample	Detection Frequency Site
Surface water (pg/L)	2002	470	330	11,000	60	7.4 [2.5]	114/114	38/38
	2003	530	450	3,100	230	9.4 [2.5]	36/36	36/36
	2004	630	540	4,400	140	14 [5.0]	38/38	38/38
	2005	520	370	7,800	140	10 [3.2]	47/47	47/47
	2006	240	200	4,300	15	9 [3]	48/48	48/48
	2007	180	140	2,700	12	7.6 [2.9]	48/48	48/48
	2008	260	250	4,300	27	7.8 [3.0]	48/48	48/48
	2009	210	170	3,900	14	10 [4]	48/48	48/48
	2010	120	99	2,200	nd	73 [24]	41/49	41/49

(Note 1) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2002.

(Note 2) " ** " indicates the sum value of the Quantification [Detection] limits of each congener.

< Sediment>

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 56 of the 64 valid sites adopting the detection limit of **220pg/g-dry, and none of the detected concentrations exceeded 710,000 pg/g-dry.

Stocktaking of the detection of PCBs (total amount) in sediment during FY2002~2010

PCBs (total amount)	Monitored year	Geometric Mean*	Median	Maximum	Minimum	Quantification [Detection] Limit**	Detection Frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	11,000	11,000	630,000	39	10 [3.5]	189/189	63/63
	2003	9,400	9,500	5,600,000	39	10 [3.2]	186/186	62/62
	2004	8,400	7,600	1,300,000	38	7.9 [2.6]	189/189	63/63
	2005	8,600	7,100	690,000	42	6.3 [2.1]	189/189	63/63
	2006	8,800	6,600	690,000	36	4 [1]	192/192	64/64
	2007	7,400	6,800	820,000	19	4.7 [1.5]	192/192	64/64
	2008	8,700	8,900	630,000	22	3.3 [1.2]	192/192	64/64
	2009	7,600	7,100	1,700,000	17	5.1 [2.1]	192/192	64/64
	2010	6,500	7,800	710,000	nd	660 [220]	56/64	56/64

(Note 1) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2002.
(Note 2) “ ** ” indicates the sum value of the Quantification [Detection] limits of each congener.

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of **20pg/g-wet, and the detection range was 1,500～46,000 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of **20pg/g-wet, and the detection range was 880～260,000 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of **20pg/g-wet, and the detection range was 6,600～9,100 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from bivalves was identified as statistically significant.

Stocktaking of the detection of PCBs (total amount) in wildlife (bivalves, fish and birds) during FY2002~2010

PCBs (total amount)	Monitored year	Geometric Mean*	Median	Maximum	Minimum	Quantification [Detection] Limit**	Detection Frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	8,800	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	11,000	11,000	150,000	1,500	85 [29]	31/31	7/7
	2005	11,000	13,000	85,000	920	69 [23]	31/31	7/7
	2006	8,500	8,600	77,000	690	42 [14]	31/31	7/7
	2007	9,000	11,000	66,000	980	46 [18]	31/31	7/7
	2008	8,600	8,600	69,000	870	47 [17]	31/31	7/7
	2009	8,700	11,000	62,000	780	32 [11]	31/31	7/7
	2010	9,200	11,000	46,000	1,500	52 [20]	6/6	6/6
Fish (pg/g-wet)	2002	17,000	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	14,000	8,600	540,000	800	69 [23]	80/80	16/16
	2006	13,000	9,000	310,000	990	42 [14]	80/80	16/16
	2007	11,000	6,200	530,000	790	46 [18]	80/80	16/16
	2008	12,000	9,100	330,000	1,200	47 [17]	85/85	17/17
	2009	12,000	12,000	290,000	840	32 [11]	90/90	18/18
	2010	13,000	10,000	260,000	880	52 [20]	18/18	18/18
Birds (pg/g-wet)	2002	12,000	14,000	22,000	4,800	25 [8.4]	10/10	2/2
	2003	19,000	22,000	42,000	6,800	50 [17]	10/10	2/2
	2004	9,000	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	12,000	9,800	48,000	5,600	42 [14]	10/10	2/2
	2007	7,600	7,800	15,000	3,900	46 [18]	10/10	2/2
	2008	9,700	7,400	56,000	3,000	47 [17]	10/10	2/2
	2009	5,900	5,700	9,500	3,900	32 [11]	10/10	2/2
	2010	7,700	---	9,100	6,600	52 [20]	2/2	2/2

(Note 1) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2002.
(Note 2) “ ** ” indicates the sum value of the Quantification [Detection] limits of each congener.

<Air>

The presence of the substance in air in the warm season was monitored at 37 sites and, excluding 2 sites whose concentrations were treated as invalid, it was detected at all 35 valid sites adopting the detection limit of **2.5pg/m^3, and the detection range was 36～970 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and, excluding 2 sites whose concentrations were treated as invalid, it was detected at all 35 valid sites adopting the detection limit of **2.5pg/m^3, and the detection range was 19～630 pg/m^3.

Stocktaking of the detection of PCBs (total amount) in air during FY2002~2010

PCBs (total amount)	Monitored year	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
	2007 Warm season	250	290	980	37	0.37 [0.13]	24/24	24/24
	2007 Cold season	72	76	230	25		22/22	22/22
	2008 Warm season	200	170	960	52	0.8 [0.3]	22/22	22/22
	2008 Cold season	93	86	1,500	21		36/36	36/36
	2009 Warm season	200	190	1,400	43	0.75 [0.26]	34/34	34/34
	2009 Cold season	85	78	380	20		34/34	34/34
	2010 Warm season	160	150	970	36	7.3 [2.5]	35/35	35/35
	2010 Cold season	84	86	630	19		35/35	35/35

(Note 1) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2002.

(Note 2) “ ** ” indicates the sum value of the Quantification [Detection] limits of each congener.

(Note 3) In 2002, there was a technical problem in the measuring method for lowly chlorinated congeners, and therefore the values are shown just as reference.

[2] Hexachlorobenzene

・ History and state of monitoring

Hexachlorobenzene had been used as pesticidal material and was designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in August 1979.

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

<Surface Water>

The presence of the substance in surface water was monitored at 49 sites, and it was detected at 39 of the 49 valid sites adopting the detection limit of 4pg/L, and none of the detected concentrations exceeded 120 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from river areas and river mouth areas were identified as statistically significant, the second-half period indicated lower concentration than the first-half period in specimens from sea areas as statistically significant and reduction tendency in specimens from the overall areas was also identified as statistically significant.

Stocktaking of the detection of Hexachlorobenzene in surface water during FY2002~2010

HCB	Monitored year	Geometric Mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface water (pg/L)	2002	37	28	1,400	9.8	0.6 [0.2]	114/114	38/38
	2003	29	24	340	11	5 [2]	36/36	36/36
	2004	30	tr(29)	180	tr(11)	30 [8]	38/38	38/38
	2005	21	17	210	tr(6)	15 [5]	47/47	47/47
	2006	16	tr(12)	190	nd	16 [5]	46/48	46/48
	2007	17	14	190	tr(4)	8 [3]	48/48	48/48
	2008	16	13	480	4	3 [1]	48/48	48/48
	2009	15	17	180	2.4	0.5 [0.2]	49/49	49/49
	2010	tr(10)	tr(8)	120	nd	13 [4]	39/49	39/49

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2002.

< Sediment>

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 1pg/g-dry, and the detection range was 4～21,000 pg/g-dry.

Stocktaking of the detection of Hexachlorobenzene in sediment during FY2002~2010

HCB	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	240	200	19,000	7.6	0.9 [0.3]	189/189	63/63
	2003	160	120	42,000	5	4 [2]	186/186	62/62
	2004	140	100	25,000	tr(6)	7 [3]	189/189	63/63
	2005	170	130	22,000	13	3 [1]	189/189	63/63
	2006	180	120	19,000	10	2.9 [1.0]	192/192	64/64
	2007	140	110	65,000	nd	5 [2]	191/192	64/64
	2008	160	97	29,000	4.4	2.0 [0.8]	192/192	64/64
	2009	150	120	34,000	nd	1.8 [0.7]	190/192	64/64
	2010	130	96	21,000	4	3 [1]	64/64	64/64

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 2pg/g-wet, and the detection range was tr(4)～210 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 2pg/g-wet, and the detection range was 36～1,700 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 2pg/g-wet, and the detection range was 500～1,900 pg/g-wet.

Stocktaking of the detection of Hexachlorobenzene in wildlife (bivalves, fish and birds) during FY2002~2010

HCB	Monitored year	Geometric Mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Bivalves (pg/g-wet)	2002	21	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	32	31	80	14	14 [4.6]	31/31	7/7
	2005	51	28	450	19	11 [3.8]	31/31	7/7
	2006	46	28	340	11	3 [1]	31/31	7/7
	2007	37	22	400	11	7 [3]	31/31	7/7
	2008	38	24	240	13	7 [3]	31/31	7/7
	2009	34	32	200	12	4 [2]	31/31	7/7
	2010	34	48	210	tr(4)	5 [2]	6/6	6/6
Fish (pg/g-wet)	2002	140	180	910	19	0.18 [0.06]	70/70	14/14
	2003	180	170	1,500	28	23 [7.5]	70/70	14/14
	2004	230	210	1,800	26	14 [4.6]	70/70	14/14
	2005	180	160	1,700	29	11 [3.8]	80/80	16/16
	2006	180	220	1,400	25	3 [1]	80/80	16/16
	2007	160	140	1,500	17	7 [3]	80/80	16/16
	2008	170	210	1,500	25	7 [3]	85/85	17/17
	2009	210	180	30,000	29	4 [2]	90/90	18/18
	2010	240	280	1,700	36	5 [2]	18/18	18/18

HCB	Monitored year	Geometric Mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Birds (pg/g-wet)	2002	1,000	1,200	1,600	560	0.18 [0.06]	10/10	2/2
	2003	1,800	2,000	4,700	790	23 [7.5]	10/10	2/2
	2004	980	1,300	2,200	410	14 [4.6]	10/10	2/2
	2005	1,000	1,100	2,500	400	11 [3.8]	10/10	2/2
	2006	970	1,100	2,100	490	3 [1]	10/10	2/2
	2007	960	1,100	2,000	420	7 [3]	10/10	2/2
	2008	880	1,100	2,500	240	7 [3]	10/10	2/2
	2009	850	910	1,500	400	4 [2]	10/10	2/2
	2010	970	---	1,900	500	5 [2]	2/2	2/2

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Air>

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 0.7pg/m^3, and the detection range was 73～160 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.7pg/m^3, and the detection range was 56～380 pg/m^3.

Stocktaking of the detection of Hexachlorobenzene in air during FY2002~2010

HCB	Monitored year	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
	2007 Warm season	110	100	230	72	0.09 [0.03]	24/24	24/24
	2007 Cold season	77	72	120	55		22/22	22/22
	2008 Warm season	120	110	260	78	0.22 [0.08]	22/22	22/22
	2008 Cold season	87	83	160	58		36/36	36/36
	2009 Warm season	110	110	210	78	0.6 [0.2]	34/34	34/34
	2009 Cold season	87	87	150	59		34/34	34/34
	2010 Warm season	120	120	160	73	1.8 [0.7]	37/37	37/37
	2010 Cold season	100	96	380	56		37/37	37/37

[3] Aldrin (reference)

・ 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.

In previous monitoring series until FY 2001, the substance was monitored in wildlife (bivalves, fish and birds) during the period of FY 1978～1989 and FY 1991 to FY 2001 under the framework of "the Wildlife Monitoring."

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.

As of FY 2010, monitoring surveys are conducted bi-annually, that is every other year. No monitoring was conducted in 2010. For reference, the monitoring results up to FY 2009 are given below.

・ Monitoring results until FY 2009

<Surface Water>

Stocktaking of the detection of aldrin in surface water during FY2002~2009

Aldrin	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Surface water (pg/L)	2002	0.8	0.9	18	nd	0.6 [0.2]	93/114	37/38
	2003	0.9	0.9	3.8	nd	0.6 [0.2]	34/36	34/36
	2004	tr(1.5)	tr(1.8)	13	nd	2 [0.4]	33/38	33/38
	2005	tr(0.6)	tr(0.7)	5.7	nd	0.9 [0.3]	32/47	32/47
	2006	nd	nd	4.4	nd	1.7 [0.6]	18/48	18/48
	2007	tr(0.6)	tr(0.6)	9.5	nd	1.0 [0.3]	34/48	34/48
	2008	tr(0.8)	tr(0.7)	21	nd	1.4 [0.6]	26/48	26/48
	2009	0.7	0.9	22	nd	0.7 [0.3]	32/49	32/49

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2002.

<Sediment>

Stocktaking of the detection of aldrin in sediment during FY2002~2009

Aldrin	Monitored year	Geometric Mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	14	12	570	nd	6 [2]	149/189	56/63
	2003	19	18	1,000	nd	2 [0.6]	178/186	60/62
	2004	10	10	390	nd	2 [0.6]	170/189	62/63
	2005	8.4	7.1	500	nd	1.4 [0.5]	173/189	62/63
	2006	10	9.3	330	nd	1.9 [0.6]	184/192	64/64
	2007	7.5	6.7	330	nd	1.8 [0.6]	172/192	60/64
	2008	6	6	370	nd	3 [1]	153/192	56/64
	2009	8.9	7.8	540	nd	0.5 [0.2]	180/192	64/64

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Wildlife>

Stocktaking of the detection of aldrin in wildlife (bivalves, fish and birds) during FY2002~2009

Aldrin	Monitored year	Geometric Mean*	Median	Maximum	Minimum	Aldrin	Detection Frequency Sample	Site
Bivalves (pg/g-wet)	2002	tr(1.6)	nd	34	nd	4.2 [1.4]	12/38	4/8
	2003	tr(1.7)	tr(0.85)	51	nd	2.5 [0.84]	15/30	3/6
	2004	tr(2.5)	tr(1.6)	46	nd	4.0 [1.3]	16/31	4/7
	2005	tr(1.8)	nd	84	nd	3.5 [1.2]	11/31	3/7
	2006	tr(2)	nd	19	nd	4 [2]	11/31	3/7
	2007	tr(2)	nd	26	nd	5 [2]	5/31	2/7
	2008	tr(2)	nd	20	nd	5 [2]	5/31	3/7
	2009	tr(1.6)	tr(0.8)	89	nd	2.1 [0.8]	16/31	6/7
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	4.0 [1.3]	5/70	2/14
	2005	nd	nd	6.4	nd	3.5 [1.2]	11/80	5/16
	2006	nd	nd	tr(2)	nd	4 [2]	2/80	2/16
	2007	nd	nd	tr(2)	nd	5 [2]	2/80	2/16
	2008	nd	nd	tr(2)	nd	5 [2]	1/85	1/17
	2009	nd	nd	3.1	nd	2.1 [0.8]	22/90	7/18
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	4.0 [1.3]	0/10	0/2
	2005	nd	nd	nd	nd	3.5 [1.2]	0/10	0/2
	2006	nd	nd	nd	nd	4 [2]	0/10	0/2
	2007	nd	nd	nd	nd	5 [2]	0/10	0/2
	2008	nd	nd	nd	nd	5 [2]	0/10	0/2
	2009	nd	nd	nd	nd	2.1 [0.8]	0/10	0/2

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Air>

Stocktaking of the detection of aldrin in air during FY2002~2009

Aldrin	Monitored year	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
	2007 Warm season	0.58	0.48	19	nd	0.05 [0.02]	35/36	35/36
	2007 Cold season	0.14	0.15	2.1	nd		34/36	34/36
	2008 Warm season	0.27	0.30	9.4	tr(0.02)	0.04 [0.02]	25/25	25/25
	2008 Cold season	0.09	0.08	1.3	nd		22/25	22/25
	2009 Warm season	0.07	nd	10	nd	0.04 [0.02]	10/25	10/25
	2009 Cold season	tr(0.03)	nd	1.8	nd		8/24	8/24

[4] Dieldrin (reference)

・ 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 had been used for termite control and was designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in October 1981.

In previous monitoring series until FY 2001, the substance was monitored in wildlife (bivalves, fish and birds) during the period of FY 1978～1996, FY 1998 and FY 1999 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.

As of FY 2010, monitoring surveys are conducted bi-annually, that is every other year. No monitoring was conducted in 2010. For reference, the monitoring results up to FY 2009 are given below.

・ Monitoring results until FY 2009

<Surface Water>

Stocktaking of the detection of dieldrin in surface water during FY2002~2009

Dieldrin	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface water (pg/L)	2002	42	41	940	3.3	1.8 [0.6]	114/114	38/38
	2003	57	57	510	9.7	0.7 [0.3]	36/36	36/36
	2004	55	51	430	9	2 [0.5]	38/38	38/38
	2005	39	49	630	4.5	1.0 [0.34]	47/47	47/47
	2006	36	32	800	6	3 [1]	48/48	48/48
	2007	38	36	750	3.1	2.1 [0.7]	48/48	48/48
	2008	36	37	450	3.6	1.5 [0.6]	48/48	48/48
	2009	36	32	650	2.7	0.6 [0.2]	49/49	49/49

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2002.

< Sediment>

Stocktaking of the detection of dieldrin in sediment during FY2002~2009

Dieldrin	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	70	51	2,300	4	3 [1]	189/189	63/63
	2003	66	56	9,100	nd	4 [2]	184/186	62/62
	2004	65	62	3,700	tr(1.9)	3 [0.9]	189/189	63/63
	2005	61	55	4,200	tr(2)	3 [1]	189/189	63/63
	2006	61	54	1,500	tr(1.7)	2.9 [1.0]	192/192	64/64
	2007	49	40	2,700	tr(1.2)	2.7 [0.9]	192/192	64/64
	2008	48	43	2,900	tr(0.7)	1.2 [0.5]	192/192	64/64
	2009	51	47	3,000	1.1	0.8 [0.3]	192/192	64/64

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Wildlife>

Stocktaking of the detection of dieldrin in wildlife (bivalves, fish and birds) during FY2002~2009

Dieldrin	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Bivalves (pg/g-wet)	2002	440	390	190,000	tr(7)	12 [4]	38/38	8/8
	2003	440	160	78,000	46	4.8 [1.6]	30/30	6/6
	2004	630	270	69,000	42	31 [10]	31/31	7/7
	2005	500	140	39,000	34	9.4 [3.4]	31/31	7/7
	2006	450	120	47,000	30	7 [3]	31/31	7/7
	2007	380	110	77,000	37	9 [3]	31/31	7/7
	2008	430	150	24,000	47	9 [3]	31/31	7/7
	2009	490	230	28,000	48	7 [2]	31/31	7/7
Fish (pg/g-wet)	2002	290	270	2,400	46	12 [4]	70/70	14/14
	2003	220	200	1,000	29	4.8 [1.6]	70/70	14/14
	2004	250	230	2,800	tr(23)	31 [10]	70/70	14/14
	2005	230	250	1,400	21	9.4 [3.4]	80/80	16/16
	2006	230	220	1,400	19	7 [3]	80/80	16/16
	2007	250	210	1,900	23	9 [3]	80/80	16/16
	2008	240	240	1,300	15	9 [3]	85/85	17/17
	2009	240	190	1,400	29	7 [2]	90/90	18/18
Birds (pg/g-wet)	2002	1,100	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	600	610	960	370	31 [10]	10/10	2/2
	2005	830	740	1,800	500	9.4 [3.4]	10/10	2/2
	2006	700	690	1,300	440	7 [3]	10/10	2/2
	2007	710	710	910	560	9 [3]	10/10	2/2
	2008	680	620	1,300	260	9 [3]	10/10	2/2
	2009	470	420	890	330	7 [2]	10/10	2/2

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Air>

Stocktaking of the detection of dieldrin in air during FY2002~2009

Dieldrin	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Ait (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
	2007 Warm season	19	22	310	1.3	0.18 [0.07]	36/36	36/36
	2007 Cold season	4.5	3.7	75	0.96		36/36	36/36
	2008 Warm season	14	16	220	1.6	0.24 [0.09]	37/37	37/37
	2008 Cold season	4.9	3.8	72	0.68		37/37	37/37
	2009 Warm season	13	13	150	0.91	0.06 [0.02]	37/37	37/37
	2009 Cold season	4.5	4.0	80	0.52		37/37	37/37

[5] Endrin (reference)

・ 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.

In previous monitoring series until FY 2001, the substance was monitored in wildlife (bivalves, fish and birds) during the periods of FY 1978～1989 and FY 1991～FY 1993 under the framework of "the Wildlife Monitoring".

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.

As of FY 2010, monitoring surveys are conducted bi-annually, that is every other year. No monitoring was conducted in 2010. For reference, the monitoring results up to FY 2009 are given below.

・ Monitoring results until FY 2009

<Surface Water>

Stocktaking of the detection of endrin in surface water during FY2002~2009

Endrin	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface water (pg/L)	2002	tr(4.8)	tr(5.5)	31	nd	6.0 [2.0]	101/114	36/38
	2003	5.7	6.0	78	0.7	0.7 [0.3]	36/36	36/36
	2004	7	7	100	tr(0.7)	2 [0.5]	38/38	38/38
	2005	4.0	4.5	120	nd	1.1 [0.4]	45/47	45/47
	2006	3.1	3.5	26	nd	1.3 [0.4]	44/48	44/48
	2007	3.5	3.4	25	nd	1.9 [0.6]	46/48	46/48
	2008	3	4	20	nd	3 [1]	45/48	45/48
	2009	2.0	2.3	67	nd	0.7 [0.3]	39/49	39/49

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2002.

<Sediment>

Stocktaking of the detection of endrin in sediment during FY2002~2009

Endrin	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	10	10	19,000	nd	6 [2]	141/189	54/63
	2003	12	11	29,000	nd	5 [2]	150/186	53/62
	2004	15	13	6,900	nd	3 [0.9]	182/189	63/63
	2005	12	11	19,000	nd	2.6 [0.9]	170/189	61/63
	2006	12	10	61,000	nd	4 [1]	178/192	63/64
	2007	11	9	61,000	nd	5 [2]	151/192	55/64
	2008	11	11	38,000	nd	1.9 [0.7]	168/192	61/64
	2009	9.6	8.4	11,000	nd	1.6 [0.6]	168/192	63/64

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Wildlife>

Stocktaking of the detection of endrin in wildlife (bivalves, fish and birds) during FY2002~2009

Endrin	Monitored year	Geometric Mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	42	27	12,000	nd	18 [6]	35/38	7/8
	2003	38	21	5,000	6.3	4.8 [1.6]	30/30	6/6
	2004	65	25	4,600	tr(5.7)	12 [4.2]	31/31	7/7
	2005	39	19	2,100	nd	17 [5.5]	27/31	7/7
	2006	40	15	3,100	tr(5)	11 [4]	31/31	7/7
	2007	28	12	3,000	tr(6)	9 [3]	31/31	7/7
	2008	30	10	1,500	tr(6)	8 [3]	31/31	7/7
	2009	38	19	1,400	tr(5)	7 [3]	31/31	7/7
Fish (pg/g-wet)	2002	20	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	19	tr(16)	2,100	nd	17 [5.5]	58/80	12/16
	2006	13	tr(10)	150	nd	11 [4]	66/80	16/16
	2007	13	12	170	nd	9 [3]	69/80	15/16
	2008	11	10	200	nd	8 [3]	63/85	14/17
	2009	17	12	270	nd	7 [3]	86/90	18/18
Birds (pg/g-wet)	2002	28	52	99	nd	18 [6]	7/10	2/2
	2003	22	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	18	28	64	nd	17 [5.5]	7/10	2/2
	2006	16	23	57	tr(4)	11 [4]	10/10	2/2
	2007	17	28	55	nd	9 [3]	9/10	2/2
	2008	10	26	83	nd	8 [3]	5/10	1/2
	2009	11	17	43	tr(3)	7 [3]	10/10	2/2

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Air>

Stocktaking of the detection of endrin in air during FY2002~2009

Endrin	Monitored year	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
	2007 Warm season	0.69	0.73	6.3	tr(0.06)	0.09 [0.04]	36/36	36/36
	2007 Cold season	0.16	0.13	1.5	nd		33/36	33/36
	2008 Warm season	0.53	0.68	4.6	tr(0.06)	0.10 [0.04]	37/37	37/37
	2008 Cold season	0.18	0.18	1.8	nd		35/37	35/37
	2009 Warm season	0.49	0.51	3.4	nd	0.09 [0.04]	36/37	36/37
	2009 Cold season	0.17	0.15	1.8	nd		36/37	36/37

[6] DDTs

・ History and state of monitoring

DDT, along with hexachlorocyclohexanes (HCHs) and drins, was 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

<Surface Water>

p,p'-DDT: The presence of the substance in surface water was monitored at 49 sites, and it was detected at all 49 valid sites adopting the detection limit of 0.8pg/L, and the detection range was tr(1.0)～7,500 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from lake areas was identified as statistically significant.

p,p'-DDE: The presence of the substance in surface water was monitored at 49 sites, and it was detected at all 49 valid sites adopting the detection limit of 0.8pg/L, and the detection range was 2.4～1,600 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from river areas and river mouth areas were identified as statistically significant.

p,p'-DDD: The presence of the substance in surface water was monitored at 49 sites, and it was detected at all 49 valid sites adopting the detection limit of 0.08pg/L, and the detection range was 1.6～970 pg/L.

Stocktaking of the detection of *p,p'*-DDT, *p,p'*-DDE and *p,p'*-DDD in surface water during FY2002~2010

p,p'-DDT	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2002	13	11	440	0.25	0.6 [0.2]	114/114	38/38
	2003	14	12	740	tr(2.8)	3 [0.9]	36/36	36/36
	2004	15	14	310	nd	6 [2]	36/38	36/38
	2005	8	9	110	1	4 [1]	47/47	47/47
	2006	9.1	9.2	170	tr(1.6)	1.9 [0.6]	48/48	48/48
	2007	7.3	9.1	670	nd	1.7 [0.6]	46/48	46/48
	2008	11	11	1,200	nd	1.2 [0.5]	47/48	47/48
	2009	9.2	8.4	440	0.81	0.15 [0.06]	49/49	49/49
	2010	8.5	7.6	7,500	tr(1.0)	2.4 [0.8]	49/49	49/49

p,p'-DDE	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2002	25	26	760	1.3	0.6 [0.2]	114/114	38/38
	2003	26	22	380	5	4 [2]	36/36	36/36
	2004	36	34	680	tr(6)	8 [3]	38/38	38/38
	2005	26	24	410	4	6 [2]	47/47	47/47
	2006	24	24	170	tr(4)	7 [2]	48/48	48/48
	2007	22	23	440	tr(2)	4 [2]	48/48	48/48
	2008	27	28	350	2.5	1.1 [0.4]	48/48	48/48
	2009	23	23	240	3.4	1.1 [0.4]	49/49	49/49
	2010	14	12	1,600	2.4	2.3 [0.8]	49/49	49/49

p,p'-DDD	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2002	16	18	190	0.57	0.24 [0.08]	114/114	38/38
	2003	19	18	410	4	2 [0.5]	36/36	36/36
	2004	19	18	740	tr(2.4)	3 [0.8]	38/38	38/38
	2005	17	16	130	tr(1.8)	1.9 [0.64]	47/47	47/47
	2006	16	17	99	2.0	1.6 [0.5]	48/48	48/48
	2007	15	12	150	tr(1.5)	1.7 [0.6]	48/48	48/48
	2008	22	20	850	2.0	0.6 [0.2]	48/48	48/48
	2009	14	13	140	1.4	0.4 [0.2]	49/49	49/49
	2010	12	10	970	1.6	0.20 [0.08]	49/49	49/49

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2002.

＜Sediment＞

p,p'-DDT: 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 0.9pg/g-dry, and the detection range was 9.3～220,000 pg/g-dry.

p,p'-DDE: 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 2pg/g-dry, and the detection range was 11～40,000 pg/g-dry.

p,p'-DDD: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 0.5pg/g-dry, and the detection range was 4.4～78,000 pg/g-dry.

Stocktaking of the detection of *p,p'*-DDT, *p,p'*-DDE and *p,p'*-DDD in sediment during FY2002~2010

p,p'-DDT	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	380	240	97,000	tr(5)	6 [2]	189/189	63/63
	2003	290	220	55,000	3	2 [0.4]	186/186	62/62
	2004	460	230	98,000	7	2 [0.5]	189/189	63/63
	2005	360	230	1,700,000	5.1	1.0 [0.34]	189/189	63/63
	2006	310	240	130,000	4.5	1.4 [0.5]	192/192	64/64
	2007	210	150	130,000	3	1.3 [0.5]	192/192	64/64
	2008	270	180	1,400,000	4.8	1.2 [0.5]	192/192	64/64
	2009	250	170	2,100,000	1.9	1.0 [0.4]	192/192	64/64
	2010	230	200	220,000	9.3	2.8 [0.9]	64/64	64/64

p,p'-DDE	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	780	630	23,000	8.4	2.7 [0.9]	189/189	63/63
	2003	790	780	80,000	9.5	0.9 [0.3]	186/186	62/62
	2004	720	700	39,000	8	3 [0.8]	189/189	63/63
	2005	710	730	64,000	8.4	2.7 [0.94]	189/189	63/63
	2006	710	820	49,000	5.8	1.0 [0.3]	192/192	64/64
	2007	670	900	61,000	3.2	1.1 [0.4]	192/192	64/64
	2008	920	940	96,000	9.0	1.7 [0.7]	192/192	64/64
	2009	700	660	50,000	6.7	0.8 [0.3]	192/192	64/64
	2010	680	790	40,000	11	5 [2]	64/64	64/64

p,p'-DDD	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	640	690	51,000	tr(2.2)	2.4 [0.8]	189/189	63/63
	2003	670	580	32,000	3.7	0.9 [0.3]	186/186	62/62
	2004	650	550	75,000	4	2 [0.7]	189/189	63/63
	2005	600	570	210,000	5.2	1.7 [0.64]	189/189	63/63
	2006	560	540	53,000	2.2	0.7 [0.2]	192/192	64/64
	2007	520	550	80,000	3.5	1.0 [0.4]	192/192	64/64
	2008	740	660	300,000	2.8	1.0 [0.4]	192/192	64/64
	2009	540	560	300,000	3.9	0.4 [0.2]	192/192	64/64
	2010	510	510	78,000	4.4	1.4 [0.5]	64/64	64/64

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Wildlife>

p,p'-DDT: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 43～470 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 7～2,100 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at 1 of the 2 valid areas adopting the detection limit of 1pg/g-wet, and none of the detected concentrations exceeded 15 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from bivalves was identified as statistically significant.

p,p'-DDE: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 230～6,300 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 260～13,000 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 6,300～160,000 pg/g-wet.

p,p'-DDD: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 0.5pg/g-wet, and the detection range was 11～960 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 0.5pg/g-wet, and the detection range was 57～2,900 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 0.5pg/g-wet, and the detection range was 120～1,600 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from bivalves was identified as statistically significant.

Stocktaking of the detection of *p,p'*-DDT in wildlife (bivalves, fish and birds) during FY2002~2010

p,p'-DDT	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
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	360	340	2,600	48	3.2 [1.1]	31/31	7/7
	2005	240	170	1,300	66	5.1 [1.7]	31/31	7/7
	2006	250	220	1,100	56	6 [2]	31/31	7/7
	2007	240	150	1,200	49	5 [2]	31/31	7/7
	2008	160	100	1,400	12	5 [2]	31/31	7/7
	2009	240	170	9,600	46	3 [1]	31/31	7/7
	2010	180	280	470	43	3 [1]	6/6	6/6
Fish (pg/g-wet)	2002	430	450	24,000	6.8	4.2 [1.4]	70/70	14/14
	2003	220	400	1,900	tr(3.7)	11 [3.5]	70/70	14/14
	2004	410	330	53,000	5.5	3.2 [1.1]	70/70	14/14
	2005	280	330	8,400	tr(3.8)	5.1 [1.7]	80/80	16/16
	2006	300	340	3,000	tr(5)	6 [2]	80/80	16/16
	2007	260	320	1,800	9	5 [2]	80/80	16/16
	2008	280	310	2,900	7	5 [2]	85/85	17/17
	2009	250	300	2,000	4	3 [1]	90/90	18/18
	2010	240	280	2,100	7	3 [1]	18/18	18/18
Birds (pg/g-wet)	2002	440	510	1,300	76	4.2 [1.4]	10/10	2/2
	2003	610	620	1,400	180	11 [3.5]	10/10	2/2
	2004	340	320	700	160	3.2 [1.1]	10/10	2/2
	2005	430	550	900	180	5.1 [1.7]	10/10	2/2
	2006	580	490	1,800	110	6 [2]	10/10	2/2
	2007	480	350	1,900	160	5 [2]	10/10	2/2
	2008	160	170	270	56	5 [2]	10/10	2/2
	2009	300	190	2,900	85	3 [1]	10/10	2/2
	2010	3	---	15	nd	3 [1]	1/2	1/2

Stocktaking of the detection of *p,p'*-DDE in wildlife (bivalves, fish and birds) during FY2002~2010

p,p'-DDE	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Bivalves (pg/g-wet)	2002	1,000	1,700	6,000	140	2.4 [0.8]	38/38	8/8
	2003	1,200	1,000	6,500	190	5.7 [1.9]	30/30	6/6
	2004	1,300	1,400	8,400	220	8.2 [2.7]	31/31	7/7
	2005	1,200	1,600	6,600	230	8.5 [2.8]	31/31	7/7
	2006	1,000	1,200	6,000	160	1.9 [0.7]	31/31	7/7
	2007	1,100	1,200	5,600	180	3 [1]	31/31	7/7
	2008	900	1,100	5,800	120	3 [1]	31/31	7/7
	2009	940	1,100	6,400	150	4 [1]	31/31	7/7
	2010	1,100	1,300	6,300	230	3 [1]	6/6	6/6
Fish (pg/g-wet)	2002	2,900	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	3,000	2,100	52,000	390	8.2 [2.7]	70/70	14/14
	2005	2,400	2,400	73,000	230	8.5 [2.8]	80/80	16/16
	2006	2,200	2,600	28,000	280	1.9 [0.7]	80/80	16/16
	2007	2,200	2,000	22,000	160	3 [1]	80/80	16/16
	2008	2,500	2,000	53,000	320	3 [1]	85/85	17/17
	2009	2,300	2,100	20,000	260	4 [1]	90/90	18/18
	2010	2,300	2,100	13,000	260	3 [1]	18/18	18/18
Birds (pg/g-wet)	2002	36,000	60,000	170,000	8,100	2.4 [0.8]	10/10	2/2
	2003	66,000	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	38,000	57,000	160,000	5,900	1.9 [0.7]	10/10	2/2
	2007	40,000	56,000	320,000	6,700	3 [1]	10/10	2/2
	2008	51,000	79,000	160,000	7,500	3 [1]	10/10	2/2
	2009	30,000	64,000	220,000	4,300	4 [1]	10/10	2/2
	2010	32,000	---	160,000	6,300	3 [1]	2/2	2/2

Stocktaking of the detection of *p,p'*-DDD in wildlife (bivalves, fish and birds) during FY2002~2010

p,p'-DDD	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	340	710	3,200	11	5.4 [1.8]	38/38	8/8
	2003	390	640	2,600	tr(7.5)	9.9 [3.3]	30/30	6/6
	2004	440	240	8,900	7.8	2.2 [0.70]	31/31	7/7
	2005	370	800	1,700	13	2.9 [0.97]	31/31	7/7
	2006	300	480	1,400	7.3	2.4 [0.9]	31/31	7/7
	2007	310	360	1,500	7	3 [1]	31/31	7/7
	2008	280	280	1,300	6	3 [1]	31/31	7/7
	2009	220	170	2,400	5.8	2.4 [0.9]	31/31	7/7
	2010	180	330	960	11	1.3 [0.5]	6/6	6/6
Fish (pg/g-wet)	2002	750	680	14,000	80	5.4 [1.8]	70/70	14/14
	2003	510	520	3,700	43	9.9 [3.3]	70/70	14/14
	2004	770	510	9,700	56	2.2 [0.70]	70/70	14/14
	2005	510	650	6,700	29	2.9 [0.97]	80/80	16/16
	2006	520	580	4,300	60	2.4 [0.9]	80/80	16/16
	2007	470	490	4,100	36	3 [1]	80/80	16/16
	2008	460	440	4,100	33	3 [1]	85/85	17/17
	2009	440	460	2,500	57	2.4 [0.9]	90/90	18/18
	2010	560	610	2,900	57	1.3 [0.5]	18/18	18/18
Birds (pg/g-wet)	2002	580	740	3,900	140	5.4 [1.8]	10/10	2/2
	2003	640	860	3,900	110	9.9 [3.3]	10/10	2/2
	2004	330	520	1,400	52	2.2 [0.70]	10/10	2/2
	2005	310	540	1,400	45	2.9 [0.97]	10/10	2/2
	2006	410	740	1,800	55	2.4 [0.9]	10/10	2/2
	2007	440	780	2,300	70	3 [1]	10/10	2/2
	2008	240	490	1,100	35	3 [1]	10/10	2/2
	2009	280	430	3,400	31	2.4 [0.9]	10/10	2/2
	2010	440	---	1,600	120	1.3 [0.5]	2/2	2/2

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Air>

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 0.03pg/m^3, and the detection range was 0.28～56 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03pg/m^3, and the detection range was 0.30～16 pg/m^3.

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 0.21pg/m^3, and the detection range was tr(0.41)～200 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.21pg/m^3, and the detection range was tr(0.47)～28 pg/m^3. As results of the inter-annual trend analysis from FY 2003 to FY 2010, reduction tendency in specimens at the warm season was identified as statistically significant.

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 0.01pg/m^3, and the detection range was 0.04～1.7 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.01pg/m^3, and the detection range was 0.02～0.41 pg/m^3.

Stocktaking of the detection of *p,p'*-DDT, *p,p'*-DDE and *p,p'*-DDD in air during FY2002~2010

p,p'-DDT	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency 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
	2007 Warm season	4.9	5.2	30	0.6	0.07 [0.03]	36/36	36/36
	2007 Cold season	1.2	1.2	8.8	0.23		36/36	36/36
	2008 Warm season	3.6	3.0	27	0.76	0.07 [0.03]	37/37	37/37
	2008 Cold season	1.2	1.0	15	0.22		37/37	37/37
	2009 Warm season	3.6	3.6	28	0.44	0.07 [0.03]	37/37	37/37
	2009 Cold season	1.1	1.0	8.0	0.20		37/37	37/37
	2010 Warm season	3.5	3.1	56	0.28	0.10 [0.03]	37/37	37/37
	2010 Cold season	1.3	0.89	16	0.30		37/37	37/37

p,p'-DDE	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency 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
	2007 Warm season	6.4	6.1	120	0.54	0.04 [0.02]	36/36	36/36
	2007 Cold season	2.1	1.9	39	0.73		36/36	36/36
	2008 Warm season	4.8	4.4	96	0.98	0.04 [0.02]	37/37	37/37
	2008 Cold season	2.2	2.0	22	0.89		37/37	37/37
	2009 Warm season	4.9	4.8	130	0.87	0.08 [0.03]	37/37	37/37
	2009 Cold season	2.1	1.9	100	0.60		37/37	37/37
	2010 Warm season	4.9	4.1	200	tr(0.41)	0.62 [0.21]	37/37	37/37
	2010 Cold season	2.2	1.8	28	tr(0.47)		37/37	37/37

p,p'-DDD	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency 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
	2007 Warm season	0.26	0.27	1.4	0.046	0.011 [0.004]	36/36	36/36
	2007 Cold season	0.093	0.087	0.5	0.026		36/36	36/36
	2008 Warm season	0.17	0.17	1.1	0.037	0.025 [0.009]	37/37	37/37
	2008 Cold season	0.091	0.081	0.31	0.036		37/37	37/37
	2009 Warm season	0.17	0.18	0.82	0.03	0.03 [0.01]	37/37	37/37
	2009 Cold season	0.08	0.08	0.35	tr(0.02)		37/37	37/37
	2010 Warm season	0.20	0.17	1.7	0.04	0.02 [0.01]	37/37	37/37
	2010 Cold season	0.10	0.09	0.41	0.02		37/37	37/37

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

<Surface Water>

o,p′-DDT: The presence of the substance in surface water was monitored at 49 sites, and it was detected at 43 of the 49 valid sites adopting the detection limit of 0.5pg/L, and none of the detected concentrations exceeded 700 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from river areas, lake areas and river mouth areas were identified as statistically significant, the second-half period indicated lower concentration than the first-half period in specimens from sea areas as statistically significant and reduction tendency in specimens from the overall areas was also identified as statistically significant.

o,p′-DDE: The presence of the substance in surface water was monitored at 49 sites, and it was detected at all 49 valid sites adopting the detection limit of 0.09pg/L, and the detection range was tr(0.13)～180 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2010, the second-half period indicated lower concentration than the first-half period in specimens from sea areas as statistically significant. In addition, the second-half period also indicated lower concentration than the first-half period in specimens from overall areas as statistically significant.

o,p′-DDD: The presence of the substance in surface water was monitored at 49 sites, and it was detected at all 49 valid sites adopting the detection limit of 0.2pg/L, and the detection range was tr(0.5)～170 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from river mouth areas was identified as statistically significant.

Stocktaking of the detection of *o,p′*-DDT, *o,p′*-DDE and *o,p′*-DDD in surface water during FY2002~2010

o,p′-DDT	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Surface Water (pg/L)	2002	5.4	4.6	77	0.19	1.2 [0.4]	114/114	38/38
	2003	6	5	100	tr(1.5)	3 [0.7]	36/36	36/36
	2004	tr(4.5)	5	85	nd	5 [2]	29/38	29/38
	2005	3	3	39	nd	3 [1]	42/47	42/47
	2006	2.8	2.4	52	0.51	2.3 [0.8]	48/48	48/48
	2007	tr(2.1)	tr(2.2)	86	nd	2.5 [0.8]	38/48	38/48
	2008	3.1	3.0	230	nd	1.4 [0.5]	44/48	44/48
	2009	2.4	2.4	100	0.43	0.16 [0.06]	49/49	49/49
	2010	1.5	tr(1.2)	700	nd	1.5 [0.5]	43/49	43/49
o,p′-DDE	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Surface Water (pg/L)	2002	2.4	2.1	680	nd	0.9 [0.3]	113/114	38/38
	2003	2.2	2.0	170	tr(0.42)	0.8 [0.3]	36/36	36/36
	2004	3	2	170	tr(0.6)	2 [0.5]	38/38	38/38
	2005	2.5	2.1	410	0.4	1.2 [0.4]	47/47	47/47
	2006	tr(1.6)	tr(1.4)	210	nd	2.6 [0.9]	28/48	28/48
	2007	tr(1.5)	tr(1.1)	210	nd	2.3 [0.8]	29/48	29/48
	2008	1.5	1.8	260	nd	0.7 [0.3]	39/48	39/48
	2009	1.3	1.1	140	nd	0.22 [0.09]	47/49	47/49
	2010	0.97	0.65	180	tr(0.13)	0.24 [0.09]	49/49	49/49

Stocktaking of the detection of *o,p'*-DDT, *o,p'*-DDE and *o,p'*-DDD in surface water during FY2002~2010

o,p'-DDD	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2002	5.6	6.0	110	nd	0.60 [0.20]	113/114	38/38
	2003	7.1	5.0	160	1.1	0.8 [0.3]	36/36	36/36
	2004	6	5	81	tr(0.7)	2 [0.5]	38/38	38/38
	2005	5.2	5.4	51	tr(0.5)	1.2 [0.4]	47/47	47/47
	2006	2.5	3.3	39	nd	0.8 [0.3]	40/48	40/48
	2007	4.6	3.9	41	tr(0.3)	0.8 [0.3]	48/48	48/48
	2008	6.7	7.2	170	nd	0.8 [0.3]	47/48	47/48
	2009	4.4	3.8	41	0.44	0.22 [0.09]	49/49	49/49
	2010	4.6	3.8	170	tr(0.5)	0.6 [0.2]	49/49	49/49

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

＜Sediment＞

o,p'-DDT: 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 0.4pg/g-dry, and the detection range was 1.4～13,000 pg/g-dry.

o,p'-DDE: 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 0.5pg/g-dry, and the detection range was tr(0.7)～25,000 pg/g-dry.

o,p'-DDD: 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 0.4pg/g-dry, and the detection range was tr(0.8)～6,900 pg/g-dry.

Stocktaking of the detection of *o,p'*-DDT, *o,p'*-DDE and *o,p'*-DDD in sediment during FY2002~2010

o,p'-DDT	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	76	47	27,000	nd	6 [2]	183/189	62/63
	2003	50	43	3,200	nd	0.8 [0.3]	185/186	62/62
	2004	69	50	17,000	tr(1.1)	2 [0.6]	189/189	63/63
	2005	58	46	160,000	0.8	0.8 [0.3]	189/189	63/63
	2006	57	52	18,000	tr(0.8)	1.2 [0.4]	192/192	64/64
	2007	38	31	27,000	nd	1.8 [0.6]	186/192	63/64
	2008	51	40	140,000	tr(0.7)	1.5 [0.6]	192/192	64/64
	2009	44	30	100,000	nd	1.2 [0.5]	190/192	64/64
	2010	40	33	13,000	1.4	1.1 [0.4]	64/64	64/64
o,p'-DDE	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	54	37	16,000	nd	3 [1]	188/189	63/63
	2003	48	39	24,000	tr(0.5)	0.6 [0.2]	186/186	62/62
	2004	40	34	28,000	nd	3 [0.8]	184/189	63/63
	2005	40	32	31,000	nd	2.6 [0.9]	181/189	62/63
	2006	42	40	27,000	tr(0.4)	1.1 [0.4]	192/192	64/64
	2007	37	41	25,000	nd	1.2 [0.4]	186/192	63/64
	2008	50	48	37,000	nd	1.4 [0.6]	186/192	63/64
	2009	37	31	33,000	nd	0.6 [0.2]	191/192	64/64
	2010	37	32	25,000	tr(0.7)	1.2 [0.5]	64/64	64/64

Stocktaking of the detection of *o,p′*-DDT, *o,p′*-DDE and *o,p′*-DDD in sediment during FY2002~2010

o,p′-DDD	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	160	150	14,000	nd	6 [2]	184/189	62/63
	2003	160	130	8,800	tr(1.0)	2 [0.5]	186/186	62/62
	2004	140	120	16,000	tr(0.7)	2 [0.5]	189/189	63/63
	2005	130	110	32,000	tr(0.8)	1.0 [0.3]	189/189	63/63
	2006	120	110	13,000	tr(0.3)	0.5 [0.2]	192/192	64/64
	2007	110	130	21,000	tr(0.5)	1.0 [0.4]	192/192	64/64
	2008	170	150	50,000	0.5	0.3 [0.1]	192/192	64/64
	2009	120	120	24,000	0.5	0.5 [0.2]	192/192	64/64
	2010	130	130	6,900	tr(0.8)	0.9 [0.4]	64/64	64/64

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Wildlife>

o,p′-DDT: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 15～160 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 5～550 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was not detected at all 18 valid areas adopting the detection limit of 1pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from bivalves and fish were identified as statistically significant.

o,p′-DDE: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 0.6pg/g-wet, and the detection range was 7.8～160 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 0.6pg/g-wet, and the detection range was tr(1.2)～2,800 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at 1 of the 2 valid areas adopting the detection limit of 0.6pg/g-wet, and none of the detected concentrations exceeded 3.7 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from bivalves and fish were identified as statistically significant.

o,p′-DDD: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 0.2pg/g-wet, and the detection range was 5.8～400 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 0.2pg/g-wet, and the detection range was 2.6～700 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 0.2pg/g-wet, and the detection range was 3.6～11 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from bivalves was identified as statistically significant.

Stocktaking of the detection of *o,p'*-DDT in wildlife (bivalves, fish and birds) during FY2002~2010

o,p'-DDT	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Bivalves (pg/g-wet)	2002	110	83	480	22	12 [4]	38/38	8/8
	2003	130	120	480	35	2.9 [0.97]	30/30	6/6
	2004	160	140	910	20	1.8 [0.61]	31/31	7/7
	2005	98	57	440	29	2.6 [0.86]	31/31	7/7
	2006	92	79	380	24	3 [1]	31/31	7/7
	2007	79	52	350	20	3 [1]	31/31	7/7
	2008	58	37	330	5	3 [1]	31/31	7/7
	2009	74	48	2,500	17	2.2 [0.8]	31/31	7/7
	2010	51	67	160	15	3 [1]	6/6	6/6
Fish (pg/g-wet)	2002	130	130	2,300	tr(6)	12 [4]	70/70	14/14
	2003	85	120	520	2.9	2.9 [0.97]	70/70	14/14
	2004	160	140	1,800	3.7	1.8 [0.61]	70/70	14/14
	2005	100	110	1,500	5.8	2.6 [0.86]	80/80	16/16
	2006	100	110	700	6	3 [1]	80/80	16/16
	2007	69	90	430	3	3 [1]	80/80	16/16
	2008	72	92	720	3	3 [1]	85/85	17/17
	2009	61	73	470	2.4	2.2 [0.8]	90/90	18/18
	2010	58	71	550	5	3 [1]	18/18	18/18
Birds (pg/g-wet)	2002	12	tr(10)	58	nd	12 [4]	8/10	2/2
	2003	24	16	66	8.3	2.9 [0.97]	10/10	2/2
	2004	8.5	13	43	tr(0.87)	1.8 [0.61]	10/10	2/2
	2005	11	14	24	3.4	2.6 [0.86]	10/10	2/2
	2006	14	10	120	3	3 [1]	10/10	2/2
	2007	9	9	26	tr(2)	3 [1]	10/10	2/2
	2008	4	6	16	nd	3 [1]	8/10	2/2
	2009	6.3	7.6	12	tr(1.4)	2.2 [0.8]	10/10	2/2
	2010	nd	---	nd	nd	3 [1]	0/2	0/2

Stocktaking of the detection of *o,p'*-DDE in wildlife (bivalves, fish and birds) during FY2002~2010

o,p'-DDE	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Bivalves (pg/g-wet)	2002	83	66	1,100	13	3.6 [1.2]	38/38	8/8
	2003	85	100	460	17	3.6 [1.2]	30/30	6/6
	2004	86	69	360	19	2.1 [0.69]	31/31	7/7
	2005	70	89	470	12	3.4 [1.1]	31/31	7/7
	2006	62	81	340	12	3 [1]	31/31	7/7
	2007	56	69	410	8.9	2.3 [0.9]	31/31	7/7
	2008	49	52	390	8	3 [1]	31/31	7/7
	2009	46	58	310	8	3 [1]	31/31	7/7
	2010	46	58	160	7.8	1.5 [0.6]	6/6	6/6
Fish (pg/g-wet)	2002	91	50	13,000	3.6	3.6 [1.2]	70/70	14/14
	2003	51	54	2,500	nd	3.6 [1.2]	67/70	14/14
	2004	76	48	5,800	tr(0.89)	2.1 [0.69]	70/70	14/14
	2005	54	45	12,000	tr(1.4)	3.4 [1.1]	80/80	16/16
	2006	56	43	4,800	tr(1)	3 [1]	80/80	16/16
	2007	45	29	4,400	nd	2.3 [0.9]	79/80	16/16
	2008	50	37	13,000	tr(1)	3 [1]	85/85	17/17
	2009	46	33	4,300	tr(1)	3 [1]	90/90	18/18
	2010	47	37	2,800	tr(1.2)	1.5 [0.6]	18/18	18/18
Birds (pg/g-wet)	2002	28	26	49	20	3.6 [1.2]	10/10	2/2
	2003	tr(2.3)	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(1.2)	tr(1.9)	tr(2.9)	nd	3.4 [1.1]	7/10	2/2
	2006	tr(1)	tr(2)	3	tr(1)	3 [1]	10/10	2/2
	2007	tr(1.0)	tr(1.4)	2.8	nd	2.3 [0.9]	6/10	2/2
	2008	tr(1)	nd	3	nd	3 [1]	5/10	1/2
	2009	nd	tr(1)	tr(2)	nd	3 [1]	6/10	2/2
	2010	tr(1.1)	---	3.7	nd	1.5 [0.6]	1/2	1/2

Stocktaking of the detection of *o,p'*-DDE in wildlife (bivalves, fish and birds) during FY2002~2010

o,p'-DDD	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Bivalves (pg/g-wet)	2002	120	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	220	130	2,800	6.0	5.7 [1.9]	31/31	7/7
	2005	170	280	1,800	10	3.3 [1.1]	31/31	7/7
	2006	150	200	1,000	7	4 [1]	31/31	7/7
	2007	150	200	1,200	6	3 [1]	31/31	7/7
	2008	130	140	1,100	5	4 [2]	31/31	7/7
	2009	95	51	1,000	5	3 [1]	31/31	7/7
	2010	57	50	400	5.8	0.6 [0.2]	6/6	6/6
Fish (pg/g-wet)	2002	95	90	1,100	nd	12 [4]	66/70	14/14
	2003	75	96	920	nd	6.0 [2.0]	66/70	14/14
	2004	120	96	1,700	nd	5.7 [1.9]	68/70	14/14
	2005	83	81	1,400	nd	3.3 [1.1]	79/80	16/16
	2006	80	86	1,100	tr(1)	4 [1]	80/80	16/16
	2007	66	62	1,300	nd	3 [1]	78/80	16/16
	2008	65	74	1,000	nd	4 [2]	80/85	16/17
	2009	63	64	760	nd	3 [1]	87/90	18/18
	2010	75	99	700	2.6	0.6 [0.2]	18/18	18/18
Birds (pg/g-wet)	2002	15	15	23	tr(8)	12 [4]	10/10	2/2
	2003	15	14	36	tr(5.0)	6.0 [2.0]	10/10	2/2
	2004	6.1	5.7	25	nd	5.7 [1.9]	9/10	2/2
	2005	7.3	7.5	9.7	4.7	3.3 [1.1]	10/10	2/2
	2006	8	8	19	5	4 [1]	10/10	2/2
	2007	7	7	10	5	3 [1]	10/10	2/2
	2008	4	tr(3)	14	tr(2)	4 [2]	10/10	2/2
	2009	6	5	13	3	3 [1]	10/10	2/2
	2010	6.3	---	11	3.6	0.6 [0.2]	2/2	2/2

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Air>

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 0.05pg/m^3, and the detection range was 0.19～26 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.05pg/m^3, and the detection range was 0.22～5.5 pg/m^3. As results of the inter-annual trend analysis from FY 2003 to FY 2010, reduction tendencies in specimens at the both season were identified as statistically significant.

o,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 0.01pg/m^3, and the detection range was 0.09～9.0 pg/m^3.

For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.01pg/m^3, and the detection range was 0.08～2.3 pg/m^3. As results of the inter-annual trend analysis from FY 2003 to FY 2010, reduction tendencies in specimens at the both season were identified as statistically significant.

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 0.01pg/m^3, and the detection range was 0.04～1.8 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.01pg/m^3, and the detection range was tr(0.02)～0.48 pg/m^3. As results of the inter-annual trend analysis from FY 2003 to FY 2010, reduction tendency in specimens at the warm season was identified as statistically significant.

Stocktaking of the detection of *o,p'*-DDT, *o,p'*-DDE and *o,p'*-DDD in air during FY2002~2010

o,p'-DDT	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Air (pg/m³)	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
	2007 Warm season	2.9	2.6	19	0.24	0.03 [0.01]	36/36	36/36
	2007 Cold season	0.77	0.63	3.4	0.31		36/36	36/36
	2008 Warm season	2.3	2.1	18	0.33	0.03 [0.01]	37/37	37/37
	2008 Cold season	0.80	0.62	6.5	0.32		37/37	37/37
	2009 Warm season	2.3	2.2	14	0.33	0.019 [0.008]	37/37	37/37
	2009 Cold season	0.80	0.71	3.7	0.20		37/37	37/37
	2010 Warm season	2.2	1.9	26	0.19	0.14 [0.05]	37/37	37/37
	2010 Cold season	0.81	0.69	5.5	0.22		37/37	37/37

o,p'-DDE	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Air (pg/m³)	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
	2007 Warm season	0.66	0.67	7	0.096	0.017 [0.007]	36/36	36/36
	2007 Cold season	0.3	0.29	3.7	0.12		36/36	36/36
	2008 Warm season	0.48	0.52	5.0	0.11	0.025 [0.009]	37/37	37/37
	2008 Cold season	0.30	0.24	1.1	0.15		37/37	37/37
	2009 Warm season	0.51	0.46	6.7	0.098	0.016 [0.006]	37/37	37/37
	2009 Cold season	0.27	0.24	23	0.072		37/37	37/37
	2010 Warm season	0.49	0.41	9.0	0.09	0.04 [0.01]	37/37	37/37
	2010 Cold season	0.27	0.23	2.3	0.08		37/37	37/37

o,p'-DDD	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Air (pg/m³)	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
	2007 Warm season	0.28	0.29	1.9	0.05	0.05 [0.02]	36/36	36/36
	2007 Cold season	0.095	0.09	0.33	tr(0.03)		36/36	36/36
	2008 Warm season	0.19	0.16	1.6	0.05	0.04 [0.01]	37/37	37/37
	2008 Cold season	0.10	0.09	0.26	0.04		37/37	37/37
	2009 Warm season	0.20	0.19	0.90	0.04	0.03 [0.01]	37/37	37/37
	2009 Cold season	0.08	0.08	0.28	tr(0.02)		37/37	37/37
	2010 Warm season	0.21	0.19	1.8	0.04	0.03 [0.01]	37/37	37/37
	2010 Cold season	0.10	0.09	0.48	tr(0.02)		37/37	37/37

[7] Chlordanes

・ History and state of monitoring

Chlordanes were used as insecticides, but the registration of Chlordanes under the Agricultural Chemicals Regulation Law was expired in FY 1968. The substances were designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in September 1986 because of its properties such as persistency, since it had been used as termitecides for wood products such as primary processed timber, plywood and house.

Although manufactured Chlordanes have complicated compositions, heptachlor, γ-chlordane, heptachlor epoxide, *cis*-chlordane, *trans*-chlordane, oxychlordane (as a chlordane metabolite), *cis*-nonachlor (not registrated as an Agricultural Chemical) and *trans*-nonachlor (not registrated as an Agricultural Chemical) were the original target chemicals in monitoring series. Since FY 1983, 5 of those 8 chemicals (*cis*-chlordane, *trans*-chlordane, oxychlordane, *cis*-nonachlor and *trans*-nonachlor) have been the target chemicals owning to their high detection frequency in the FY 1982 High-Pre*cis*ion Environmental Survey.

In previous monitoring series, Chlordanes 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”, *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, *cis*-chlordane, *trans*-chlordane, oxychlordane (as a chlordane metabolite), *cis*-nonachlor (not registrated as an Agricultural Chemical) and *trans*-nonachlor have been monitored in surface water, sediment, wildlife (bivalves, fish and birds) and air since FY 2002.

・ Monitoring results

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

<Surface Water>

cis-chlordane: The presence of the substance in surface water was monitored at 49 sites, and it was detected at 47 of the 49 valid sites adopting the detection limit of 4pg/L, and none of the detected concentrations exceeded 170 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from river areas, river mouth areas and sea areas were identified as statistically significant and reduction tendency in specimens from the overall areas was also identified as statistically significant.

trans-chlordane: The presence of the substance in surface water was monitored at 49 sites, and it was detected at 44 of the 49 valid sites adopting the detection limit of 4pg/L, and none of the detected concentrations exceeded 310 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimen from sea areas was identified as statistically significant and reduction tendency in specimens from the overall areas was also identified as statistically significant.

Stocktaking of the detection of *cis*-chlordane and *trans*-chlordane in surface water FY2002~2010

cis-chlordane	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Surface Water (pg/L)	2002	42	32	880	2.5	0.9 [0.3]	114/114	38/38
	2003	69	51	920	12	3 [0.9]	36/36	36/36
	2004	92	87	1,900	10	6 [2]	38/38	38/38
	2005	53	54	510	6	4 [1]	47/47	47/47
	2006	31	26	440	5	5 [2]	48/48	48/48
	2007	23	22	680	nd	4 [2]	47/48	47/48
	2008	29	29	480	2.9	1.6 [0.6]	48/48	48/48
	2009	29	26	710	4.4	1.1 [0.4]	49/49	49/49
	2010	19	14	170	nd	11 [4]	47/49	47/49
trans-chlordane	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Surface Water (pg/L)	2002	33	24	780	3.1	1.5 [0.5]	114/114	38/38
	2003	34	30	410	6	5 [2]	36/36	36/36
	2004	32	26	1,200	5	5 [2]	38/38	38/38
	2005	25	21	200	3	4 [1]	47/47	47/47
	2006	24	16	330	tr(4)	7 [2]	48/48	48/48
	2007	16	20	580	nd	2.4 [0.8]	47/48	47/48
	2008	23	22	420	3	3 [1]	48/48	48/48
	2009	23	18	690	3.0	0.8 [0.3]	49/49	49/49
	2010	15	tr(11)	310	nd	13 [4]	44/49	44/49

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2002.

<Sediment>

cis-chlordane: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 2pg/g-dry, and the detection range was tr(4)～7,200 pg/g-dry. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from lake areas and sea areas were identified as statistically significant and reduction tendency in specimens from the overall areas was also identified as statistically significant.

trans-chlordane: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 4pg/g-dry, and the detection range was tr(4)～8,000 pg/g-dry. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from sea areas were identified as statistically significant

Stocktaking of the detection of *cis*-chlordane and *trans*-chlordane in sediment FY2002~2010

cis-chlordane	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Sediment (pg/g-dry)	2002	140	98	18,000	1.8	0.9 [0.3]	189/189	63/63
	2003	190	140	19,000	tr(3.6)	4 [2]	186/186	62/62
	2004	160	97	36,000	4	4 [2]	189/189	63/63
	2005	150	100	44,000	3.3	1.9 [0.64]	189/189	63/63
	2006	100	70	13,000	tr(0.9)	2.4 [0.8]	192/192	64/64
	2007	82	55	7,500	nd	5 [2]	191/192	64/64
	2008	100	63	11,000	tr(2.3)	2.4 [0.9]	192/192	64/64
	2009	84	61	8,600	2.0	0.7 [0.3]	192/192	64/64
	2010	82	62	7,200	tr(4)	6 [2]	64/64	64/64

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

Stocktaking of the detection of *cis*-chlordane and *trans*-chlordane in sediment FY2002~2010

trans-chlordane	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	150	110	16,000	2.1	1.8 [0.6]	189/189	63/63
	2003	130	100	13,000	tr(2.4)	4 [2]	186/186	62/62
	2004	110	80	26,000	3	3 [0.9]	189/189	63/63
	2005	110	81	32,000	3.4	2.3 [0.84]	189/189	63/63
	2006	110	76	12,000	2.2	1.1 [0.4]	192/192	64/64
	2007	82	58	7,500	nd	2.2 [0.8]	191/192	64/64
	2008	110	66	10,000	2.4	2.0 [0.8]	192/192	64/64
	2009	91	68	8,300	2.1	1.7 [0.7]	192/192	64/64
	2010	95	69	8,000	tr(4)	11 [4]	64/64	64/64

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Wildlife>

cis-chlordane: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 2pg/g-wet, and the detection range was 67～15,000 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 2pg/g-wet, and the detection range was 51～3,400 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 2pg/g-wet, and the detection range was 4～180 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from bivalves and fish were identified as statistically significant.

trans-chlordane: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 31～5,500 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 9～1,100 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was tr(2)～10 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from bivalves and fish were identified as statistically significant.

Stocktaking of the detection of *cis*-chlordane in wildlife (bivalves, fish and birds) FY2002~2010

cis-chlordane	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Bivalves (pg/g-wet)	2002	730	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	1,300	1,600	14,000	91	18 [5.8]	31/31	7/7
	2005	1,000	960	13,000	78	12 [3.9]	31/31	7/7
	2006	970	1,100	18,000	67	4 [1]	31/31	7/7
	2007	870	590	19,000	59	5 [2]	31/31	7/7
	2008	750	560	11,000	85	5 [2]	31/31	7/7
	2009	1,200	1,100	16,000	83	4 [2]	31/31	7/7
	2010	1,600	2,300	15,000	67	4 [2]	6/6	6/6

Stocktaking of the detection of *cis*-chlordane in wildlife (bivalves, fish and birds) FY2002~2010

cis-chlordane	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Fish (pg/g-wet)	2002	610	550	6,900	57	2.4 [0.8]	70/70	14/14
	2003	510	400	4,400	43	3.9 [1.3]	70/70	14/14
	2004	620	490	9,800	68	18 [5.8]	70/70	14/14
	2005	520	600	8,000	42	12 [3.9]	80/80	16/16
	2006	520	420	4,900	56	4 [1]	80/80	16/16
	2007	430	360	5,200	30	5 [2]	80/80	16/16
	2008	430	340	3,500	36	5 [2]	85/85	17/17
	2009	430	450	3,200	41	4 [2]	90/90	18/18
	2010	450	630	3,400	51	4 [2]	18/18	18/18
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	53	120	340	tr(5.8)	12 [3.9]	10/10	2/2
	2006	32	83	250	5	4 [1]	10/10	2/2
	2007	29	83	230	tr(4)	5 [2]	10/10	2/2
	2008	24	87	280	tr(3)	5 [2]	10/10	2/2
	2009	21	48	130	4	4 [2]	10/10	2/2
	2010	27	---	180	4	4 [2]	2/2	2/2

Stocktaking of the detection of *trans*-chlordane in wildlife (bivalves, fish and birds) FY2002~2010

trans-chlordane	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Bivalves (pg/g-wet)	2002	390	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	560	770	2,800	53	48 [16]	31/31	7/7
	2005	470	660	2,400	40	10 [3.5]	31/31	7/7
	2006	470	580	2,800	41	4 [2]	31/31	7/7
	2007	440	460	1,500	34	6 [2]	31/31	7/7
	2008	360	410	1,300	52	7 [3]	31/31	7/7
	2009	540	560	16,000	48	4 [1]	31/31	7/7
	2010	520	640	5,500	31	3 [1]	6/6	6/6
Fish (pg/g-wet)	2002	190	160	2,700	20	2.4 [0.8]	70/70	14/14
	2003	160	120	1,800	9.6	7.2 [2.4]	70/70	14/14
	2004	200	130	5,200	tr(17)	48 [16]	70/70	14/14
	2005	160	180	3,100	tr(9.8)	10 [3.5]	76/80	16/16
	2006	150	120	2,000	14	4 [2]	80/80	16/16
	2007	130	100	2,100	8	6 [2]	80/80	16/16
	2008	120	71	1,300	14	7 [3]	85/85	17/17
	2009	130	140	1,300	10	4 [1]	90/90	18/18
	2010	120	170	1,100	9	3 [1]	18/18	18/18
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	nd	nd	tr(26)	nd	48 [16]	5/10	1/2
	2005	11	12	30	tr(4.5)	10 [3.5]	10/10	2/2
	2006	7	8	17	tr(3)	4 [2]	10/10	2/2
	2007	7	8	19	tr(3)	6 [2]	10/10	2/2
	2008	tr(5)	9	27	nd	7 [3]	7/10	2/2
	2009	6	7	13	tr(3)	4 [1]	10/10	2/2
	2010	4	---	10	tr(2)	3 [1]	2/2	2/2

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

＜Air＞

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 0.3pg/m^3, and the detection range was 2.2～700 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.3pg/m^3, and the detection range was tr(0.8)～130 pg/m^3. As results of the inter-annual trend analysis from FY 2003 to FY 2010, reduction tendency in specimens at the warm season was identified as statistically significant.

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 0.4pg/m^3, and the detection range was 2.0～820 pg/m^3.

For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.4pg/m^3, and the detection range was tr(1.0)～150 pg/m^3. As results of the inter-annual trend analysis from FY 2003 to FY 2010, reduction tendencies in specimens at the both season were identified as statistically significant.

Stocktaking of the detection of *cis*-chlordane and *trans*-chlordane in air during FY2002~2010

cis-chlordane	Monitored year	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
	2007 Warm season	90	120	1,100	3.3	0.10 [0.04]	36/36	36/36
	2007 Cold season	17	20	230	1.4		36/36	36/36
	2008 Warm season	75	120	790	1.9	0.14 [0.05]	37/37	37/37
	2008 Cold season	21	34	200	1.5		37/37	37/37
	2009 Warm season	67	110	790	2.7	0.16 [0.06]	37/37	37/37
	2009 Cold season	19	22	180	0.65		37/37	37/37
	2010 Warm season	68	100	700	1.8	0.17 [0.06]	37/37	37/37
	2010 Cold season	20	27	130	0.84		37/37	37/37

trans-chlordane	Monitored year	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
	2007 Warm season	100	140	1,300	3.8	0.12 [0.05]	36/36	36/36
	2007 Cold season	20	24	300	1.5		36/36	36/36
	2008 Warm season	87	130	990	2.5	0.17 [0.06]	37/37	37/37
	2008 Cold season	25	41	250	1.8		37/37	37/37
	2009 Warm season	79	120	960	2.6	0.12 [0.05]	37/37	37/37
	2009 Cold season	23	30	210	0.68		37/37	37/37
	2010 Warm season	79	120	820	2.0	1.2 [0.4]	37/37	37/37
	2010 Cold season	24	34	150	tr(1.0)		37/37	37/37

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

<Surface Water>

Oxychlordane: The presence of the substance in surface water was monitored at 49 sites, and it was detected at 47 of the 49 valid sites adopting the detection limit of 0.3pg/L, and none of the detected concentrations exceeded 45 pg/L.

cis-Nonachlor: The presence of the substance in surface water was monitored at 49 sites, and it was detected at all 49 valid sites adopting the detection limit of 0.4pg/L, and the detection range was tr(0.9)～40 pg/L.

trans-Nonachlor: The presence of the substance in surface water was monitored at 49 sites, and it was detected at 45 of the 49 valid sites adopting the detection limit of 3pg/L, and none of the detected concentrations exceeded 93 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from sea areas were identified as statistically significant and reduction tendency in specimens from the overall areas was also identified as statistically significant.

Stocktaking of the detection of Oxychlordane, *cis*-Nonachlor and *trans*-Nonachlor in surface water during FY2002~2010

Oxychlordane	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2002	2.7	3.5	41	nd	1.2 [0.4]	96/114	35/38
	2003	3	2	39	tr(0.6)	2 [0.5]	36/36	36/36
	2004	3.2	2.9	47	tr(0.7)	2 [0.5]	38/38	38/38
	2005	2.6	2.1	19	nd	1.1 [0.4]	46/47	46/47
	2006	tr(2.5)	tr(2.4)	18	nd	2.8 [0.9]	43/48	43/48
	2007	tr(2)	nd	41	nd	6 [2]	25/48	25/48
	2008	1.9	1.9	14	nd	1.9 [0.7]	40/48	40/48
	2009	2.0	1.9	19	nd	1.1 [0.4]	45/49	45/49
	2010	1.5	1.3	45	nd	0.7 [0.3]	47/49	47/49
cis-Nonachlor	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2002	7.9	6.7	250	0.23	1.8 [0.6]	114/114	38/38
	2003	8.0	7.0	130	1.3	0.3 [0.1]	36/36	36/36
	2004	7.5	6.3	340	0.8	0.6 [0.2]	38/38	38/38
	2005	6.0	5.9	43	0.9	0.5 [0.2]	47/47	47/47
	2006	6.6	5.6	83	1.0	0.8 [0.3]	48/48	48/48
	2007	5.9	6.1	210	nd	2.4 [0.8]	43/48	43/48
	2008	6.5	5.9	130	0.9	0.9 [0.3]	48/48	48/48
	2009	7.1	5.5	210	1.4	0.3 [0.1]	49/49	49/49
	2010	5.4	3.9	40	tr(0.9)	1.3 [0.4]	49/49	49/49
trans-Nonachlor	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2002	30	24	780	1.8	1.2 [0.4]	114/114	38/38
	2003	26	20	450	4	2 [0.5]	36/36	36/36
	2004	25	19	1,100	tr(3)	4 [2]	38/38	38/38
	2005	20	17	150	2.6	2.5 [0.84]	47/47	47/47
	2006	21	16	310	3.2	3.0 [1.0]	48/48	48/48
	2007	17	17	540	tr(2)	5 [2]	48/48	48/48
	2008	18	17	340	1.9	1.6 [0.6]	48/48	48/48
	2009	20	17	530	2.7	1.0 [0.4]	49/49	49/49
	2010	12	11	93	nd	8 [3]	45/49	45/49

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2002.

<Sediment>

Oxychlordane: The presence of the substance in sediment was monitored at 64 sites, and it was detected at 56 of the 64 valid sites adopting the detection limit of 0.4pg/g-dry, and none of the detected concentrations exceeded 60 pg/g-dry.

cis-Nonachlor: 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 0.3pg/g-dry, and the detection range was 2.3～3,600 pg/g-dry. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from sea areas were identified as statistically significant.

trans-Nonachlor: 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 2pg/g-dry, and the detection range was tr(3)～6,200 pg/g-dry. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from sea areas were identified as statistically significant.

Stocktaking of the detection of Oxychlordane, *cis*-Nonachlor and *trans*-Nonachlor in sediment during FY2002~2010

Oxychlordane	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	2.7	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(2.1)	tr(1.3)	140	nd	3 [0.8]	129/189	54/63
	2005	2.3	tr(1.9)	160	nd	2.0 [0.7]	133/189	51/63
	2006	tr(2.5)	tr(1.7)	280	nd	2.9 [1.0]	141/192	54/64
	2007	tr(2.1)	tr(1.5)	76	nd	2.5 [0.9]	117/192	46/64
	2008	tr(2)	tr(1)	340	nd	3 [1]	110/192	48/64
	2009	2	tr(1)	150	nd	2 [1]	97/192	45/64
	2010	1.7	1.2	60	nd	1.0 [0.4]	56/64	56/64
cis-Nonachlor	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	76	66	7,800	nd	2.1 [0.7]	188/189	63/63
	2003	66	50	6,500	nd	3 [0.9]	184/186	62/62
	2004	53	34	9,400	tr(0.8)	2 [0.6]	189/189	63/63
	2005	56	42	9,900	tr(1.1)	1.9 [0.64]	189/189	63/63
	2006	58	48	5,800	tr(0.6)	1.2 [0.4]	192/192	64/64
	2007	48	35	4,200	nd	1.6 [0.6]	191/192	64/64
	2008	57	42	5,100	1.1	0.6 [0.2]	192/192	64/64
	2009	53	38	4,700	1.4	1.0 [0.4]	192/192	64/64
	2010	53	45	3,600	2.3	0.9 [0.3]	64/64	64/64
trans-Nonachlor	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	130	83	13,000	3.1	1.5 [0.5]	189/189	63/63
	2003	110	78	11,000	2	2 [0.6]	186/186	62/62
	2004	94	63	23,000	3	2 [0.6]	189/189	63/63
	2005	99	72	24,000	2.4	1.5 [0.54]	189/189	63/63
	2006	100	65	10,000	3.4	1.2 [0.4]	192/192	64/64
	2007	78	55	8,400	tr(1.6)	1.7 [0.6]	192/192	64/64
	2008	91	53	8,400	tr(1.6)	2.2 [0.8]	192/192	64/64
	2009	85	58	7,800	2.0	0.9 [0.3]	192/192	64/64
	2010	80	65	6,200	tr(3)	6 [2]	64/64	64/64

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

＜Wildlife＞

Oxychlordane: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 3pg/g-wet, and the detection range was 11～3,300 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 3pg/g-wet, and the detection range was 33～1,000 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 3pg/g-wet, and the detection range was 320～510 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from bivalves and fish were identified as statistically significant.

cis-Nonachlor: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 35～1,300 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 23～2,200 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 57～190 pg/g-wet.

trans-Nonachlor: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 2pg/g-wet, and the detection range was 84～6,000 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 2pg/g-wet, and the detection range was 110～4,700 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 2pg/g-wet, and the detection range was 290～880 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from bivalves were identified as statistically significant.

Stocktaking of the detection of Oxychlordane in wildlife (bivalves, fish and birds) during FY2002~2010

Oxychlordane	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Bivalves (pg/g-wet)	2002	71	83	5,600	nd	3.6 [1.2]	37/38	8/8
	2003	93	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	99	79	1,400	12	9.3 [3.1]	31/31	7/7
	2006	91	90	2,400	7	7 [3]	31/31	7/7
	2007	70	43	2,200	8	6 [2]	31/31	7/7
	2008	64	55	1,100	7	7 [2]	31/31	7/7
	2009	100	89	820	10	4 [1]	31/31	7/7
	2010	240	390	3,300	11	8 [3]	6/6	6/6
Fish (pg/g-wet)	2002	170	140	3,900	16	3.6 [1.2]	70/70	14/14
	2003	150	160	820	30	8.4 [2.8]	70/70	14/14
	2004	160	140	1,500	25	9.2 [3.1]	70/70	14/14
	2005	150	150	1,900	20	9.3 [3.1]	80/80	16/16
	2006	150	120	3,000	28	7 [3]	80/80	16/16
	2007	120	100	1,900	17	6 [2]	80/80	16/16
	2008	130	130	2,200	15	7 [2]	85/85	17/17
	2009	120	99	2,400	23	4 [1]	90/90	18/18
	2010	120	140	1,000	33	8 [3]	18/18	18/18
Birds (pg/g-wet)	2002	640	630	890	470	3.6 [1.2]	10/10	2/2
	2003	760	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	610	660	860	390	9.3 [3.1]	10/10	2/2
	2006	510	560	720	270	7 [3]	10/10	2/2
	2007	440	400	740	290	6 [2]	10/10	2/2
	2008	560	530	960	290	7 [2]	10/10	2/2
	2009	300	290	540	190	4 [1]	10/10	2/2
	2010	400	---	510	320	8 [3]	2/2	2/2

Stocktaking of the detection of *cis*-Nonachlor in wildlife (bivalves, fish and birds) during FY2002~2010

cis-Nonachlor	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Bivalves (pg/g-wet)	2002	170	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	320	380	1,800	43	3.4 [1.1]	31/31	7/7
	2005	270	220	1,300	27	4.5 [1.5]	31/31	7/7
	2006	270	180	1,500	31	3 [1]	31/31	7/7
	2007	250	250	1,000	26	3 [1]	31/31	7/7
	2008	210	210	780	33	4 [1]	31/31	7/7
	2009	300	310	10,000	31	3 [1]	31/31	7/7
	2010	280	310	1,300	35	3 [1]	6/6	6/6
Fish (pg/g-wet)	2002	460	420	5,100	46	1.2 [0.4]	70/70	14/14
	2003	360	360	2,600	19	4.8 [1.6]	70/70	14/14
	2004	430	310	10,000	48	3.4 [1.1]	70/70	14/14
	2005	380	360	6,200	27	4.5 [1.5]	80/80	16/16
	2006	370	330	3,300	33	3 [1]	80/80	16/16
	2007	320	280	3,700	16	3 [1]	80/80	16/16
	2008	350	300	3,200	46	4 [1]	85/85	17/17
	2009	340	340	2,600	27	3 [1]	90/90	18/18
	2010	320	370	2,200	23	3 [1]	18/18	18/18
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	140	150	240	73	3.4 [1.1]	10/10	2/2
	2005	160	180	370	86	4.5 [1.5]	10/10	2/2
	2006	120	130	270	60	3 [1]	10/10	2/2
	2007	130	140	300	42	3 [1]	10/10	2/2
	2008	140	150	410	37	4 [1]	10/10	2/2
	2009	81	85	160	44	3 [1]	10/10	2/2
	2010	100	---	190	57	3 [1]	2/2	2/2

trans-Nonachlor	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Bivalves (pg/g-wet)	2002	450	1,100	1,800	21	2.4 [0.8]	38/38	8/8
	2003	800	700	3,800	140	3.6 [1.2]	30/30	6/6
	2004	780	870	3,400	110	13 [4.2]	31/31	7/7
	2005	700	650	3,400	72	6.2 [2.1]	31/31	7/7
	2006	660	610	3,200	85	3 [1]	31/31	7/7
	2007	640	610	2,400	71	7 [3]	31/31	7/7
	2008	510	510	2,000	94	6 [2]	31/31	7/7
	2009	780	680	33,000	79	3 [1]	31/31	7/7
	2010	790	870	6,000	84	4 [2]	6/6	6/6
Fish (pg/g-wet)	2002	1,000	900	8,300	98	2.4 [0.8]	70/70	14/14
	2003	920	840	5,800	85	3.6 [1.2]	70/70	14/14
	2004	1,100	760	21,000	140	13 [4.2]	70/70	14/14
	2005	970	750	13,000	80	6.2 [2.1]	80/80	16/16
	2006	940	680	6,900	120	3 [1]	80/80	16/16
	2007	800	680	7,900	71	7 [3]	80/80	16/16
	2008	860	750	6,900	87	6 [2]	85/85	17/17
	2009	810	720	7,400	68	3 [1]	90/90	18/18
	2010	800	---	4,700	110	4 [2]	18/18	18/18
Birds (pg/g-wet)	2002	890	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	690	780	1,200	390	13 [4.2]	10/10	2/2
	2005	870	880	2,000	440	6.2 [2.1]	10/10	2/2
	2006	650	620	1,500	310	3 [1]	10/10	2/2
	2007	590	680	1,400	200	7 [3]	10/10	2/2
	2008	740	850	2,600	180	6 [2]	10/10	2/2
	2009	400	430	730	220	3 [1]	10/10	2/2
	2010	510	---	880	290	4 [2]	2/2	2/2

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Air>

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 0.01pg/m^3, and the detection range was 0.44～6.2 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.01pg/m^3, and the detection range was 0.26～2.3 pg/m^3. As results of the inter-annual trend analysis from FY 2003 to FY 2010, reduction tendency in specimens at the warm season was identified as statistically significant.

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 0.04pg/m^3, and the detection range was 0.23～68 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.04pg/m^3, and the detection range was tr(0.06)～13 pg/m^3. As results of the inter-annual trend analysis from FY 2003 to FY 2010, reduction tendency in specimens at the warm season was identified as statistically significant.

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 0.3pg/m^3, and the detection range was 1.7～520 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.3pg/m^3, and the detection range was tr(0.7)～89 pg/m^3. As results of the inter-annual trend analysis from FY 2003 to FY 2010, reduction tendency in specimens at the warm season was identified as statistically significant.

Stocktaking of the detection of Oxychlordane, cis-Nonachlor and trans-Nonachlor in air during FY2002~2010

Oxychlordane	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Air (pg/m^3)	2002	0.96	0.98	8.3	nd	0.024 [0.008]	101/102	34/34
	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
	2007 Warm season	1.9	1.8	8.6	0.56	0.05 [0.02]	36/36	36/36
	2007 Cold season	0.61	0.63	2.4	0.26		36/36	36/36
	2008 Warm season	1.7	1.7	7.1	0.50	0.04 [0.01]	37/37	37/37
	2008 Cold season	0.61	0.63	1.8	0.27		37/37	37/37
	2009 Warm season	1.7	1.8	6.5	0.38	0.04 [0.02]	37/37	37/37
	2009 Cold season	0.65	0.61	2.7	0.24		37/37	37/37
	2010 Warm season	1.5	1.5	6.2	0.44	0.03 [0.01]	37/37	37/37
	2010 Cold season	0.56	0.55	2.3	0.26		37/37	37/37

Stocktaking of the detection of Oxychlordane, cis-Nonachlor and trans-Nonachlor in air during FY2002~2010

cis-Nonachlor	Monitored year	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
	2007 Warm season	10	14	150	0.31	0.03 [0.01]	36/36	36/36
	2007 Cold season	1.6	1.7	22	0.09		36/36	36/36
	2008 Warm season	7.9	12	87	0.18	0.03 [0.01]	37/37	37/37
	2008 Cold season	2.0	2.7	19	0.16		37/37	37/37
	2009 Warm season	7.5	10	110	0.33	0.04 [0.02]	37/37	37/37
	2009 Cold season	1.9	2.1	18	0.07		37/37	37/37
	2010 Warm season	7.5	10	68	0.23	0.11 [0.04]	37/37	37/37
	2010 Cold season	1.8	2.1	13	tr(0.06)		37/37	37/37

trans-Nonachlor	Monitored year	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
	2007 Warm season	72	96	940	2.5	0.09 [0.03]	36/36	36/36
	2007 Cold season	13	15	190	1.1		36/36	36/36
	2008 Warm season	59	91	650	1.5	0.09 [0.03]	37/37	37/37
	2008 Cold season	17	25	170	1.3		37/37	37/37
	2009 Warm season	54	81	630	2.2	0.07 [0.03]	37/37	37/37
	2009 Cold season	16	19	140	0.75		37/37	37/37
	2010 Warm season	52	78	520	1.7	0.8 [0.3]	37/37	37/37
	2010 Cold season	15	17	89	tr(0.7)		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 registrated under the Agricultural Chemicals Regulation Law in FY 1975. The substances were designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in September 1986, since it includes the technical chlordane used as a termitecide.

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

Under the framework of the Environmental Monitoring, Heptachlor in water, sediment, and fish has been monitored since FY 2002, and *cis*-Heptachlor epoxide and *trans*-Heptachlor epoxide have also been monitored since FY 2003.

・ Monitoring results

○ heptachlor, *cis*-heptachlor epoxide, and *trans*-heptachlor epoxide

<Surface Water>

heptachlor: The presence of the substance in surface water was monitored at 49 sites, and it was detected at 4 of the 49 valid sites adopting the detection limit of 0.7pg/L, and none of the detected concentrations exceeded 43 pg/L.

cis-heptachlor epoxide: The presence of the substance in surface water was monitored at 49 sites, and it was detected at all 49 valid sites adopting the detection limit of 0.2pg/L, and the detection range was 0.7～710 pg/L. As results of the inter-annual trend analysis from FY 2003 to FY 2010, reduction tendencies in specimens from river mouth areas and sea areas were identified as statistically significant.

trans-heptachlor epoxide: The presence of the substance in surface water was monitored at 49 sites, and it was detected at 2 of the 49 valid sites adopting the detection limit of 0.5pg/L, and none of the detected concentrations exceeded 8.0 pg/L.

Stocktaking of the detection of heptachlor, *cis*-heptachlor epocide and *trans*-heptachlor epocide in surface water during FY2002~2010

Heptachlor	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2002	tr(1.2)	tr(1.0)	25	nd	1.5 [0.5]	97/114	38/38
	2003	tr(1.8)	tr(1.6)	7	tr(1.0)	2 [0.5]	36/36	36/36
	2004	nd	nd	29	nd	5 [2]	9/38	9/38
	2005	nd	tr(1)	54	nd	3 [1]	25/47	25/47
	2006	nd	nd	6	nd	5 [2]	5/48	5/48
	2007	nd	nd	5.2	nd	2.4 [0.8]	12/48	12/48
	2008	nd	nd	4.6	nd	2.1 [0.8]	19/48	19/48
	2009	tr(0.5)	nd	17	nd	0.8 [0.3]	20/49	20/49
	2010	nd	nd	43	nd	2.2 [0.7]	4/49	4/49
cis-Heptachlor epoxide	Monitored year	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
	2007	6.1	5.8	120	tr(0.9)	1.3 [0.4]	48/48	48/48
	2008	4.7	5.0	37	nd	0.6 [0.2]	46/48	46/48
	2009	5.5	4.2	72	0.8	0.5 [0.2]	49/49	49/49
	2010	5.9	3.9	710	0.7	0.4 [0.2]	49/49	49/49
trans-Heptachlor epoxide	Monitored year	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
	2007	nd	nd	tr(0.9)	nd	2.0 [0.7]	2/48	2/48
	2008	nd	nd	nd	nd	1.9 [0.7]	0/48	0/48
	2009	nd	nd	nd	nd	0.7 [0.3]	0/49	0/49
	2010	nd	nd	8.0	nd	1.3 [0.5]	2/49	2/49

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2002.

<Sediment>

Heptachlor: The presence of the substance in sediment was monitored at 64 sites, and it was detected at 51 of the 64 valid sites adopting the detection limit of 0.4pg/g-dry, and none of the detected concentrations exceeded 35 pg/g-dry. As results of the inter-annual trend analysis from FY 2002 to FY 2010, the second-half period indicated lower concentration than the first-half period in specimens from river mouth areas as statistically significant.

cis-heptachlor epoxide: The presence of the substance in sediment was monitored at 64 sites, and it was detected at 62 of the 64 valid sites adopting the detection limit of 0.3pg/g-dry, and none of the detected concentrations exceeded 300 pg/g-dry. As results of the inter-annual trend analysis from FY 2003 to FY 2010, reduction tendencies in specimens from river mouth areas were identified as statistically significant. In addition, the second-half period also indicated lower concentration than the first-half period in specimens from overall areas as statistically significant.

trans-heptachlor epoxide: The presence of the substance in sediment was monitored at 64 sites, and it was detected at 1 of the 64 valid site adopting the detection limit of 1pg/g-dry, and none of the detected concentrations exceeded 4 pg/g-dry.

Stocktaking of the detection of heptachlor, *cis*-heptachlor epocide and *trans*-heptachlor epocide in sediment during FY2002~2010

Heptachlor	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	4.1	3.2	120	nd	1.8 [0.6]	167/189	60/63
	2003	tr(2.7)	tr(2.2)	160	nd	3 [1.0]	138/186	53/62
	2004	tr(2.8)	tr(2.3)	170	nd	3 [0.9]	134/189	53/63
	2005	3.1	2.8	200	nd	2.5 [0.8]	120/189	48/63
	2006	5.2	3.9	230	nd	1.9 [0.6]	190/192	64/64
	2007	tr(1.8)	tr(1.5)	110	nd	3.0 [0.7]	143/192	57/64
	2008	tr(1)	nd	85	nd	4 [1]	59/192	27/64
	2009	1.6	1.3	65	nd	1.1 [0.4]	144/192	59/64
	2010	1.2	tr(0.8)	35	nd	1.1 [0.4]	51/64	51/64
cis-Heptachlor epoxide	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2003	4	3	160	nd	3 [1]	153/186	55/62
	2004	tr(5)	tr(3)	230	nd	6 [2]	136/189	52/63
	2005	tr(4)	tr(3)	140	nd	7 [2]	119/189	49/63
	2006	4.0	3.2	210	nd	3.0 [1.0]	157/192	58/64
	2007	3	tr(2)	270	nd	3 [1]	141/192	53/64
	2008	3	2	180	nd	2 [1]	130/192	51/64
	2009	2.7	1.9	290	nd	0.7 [0.3]	176/192	63/64
	2010	3.1	2.4	300	nd	0.8 [0.3]	62/64	62/64
trans-Heptachlor epoxide	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2003	nd	nd	nd	nd	9 [3]	0/186	0/62
	2004	nd	nd	tr(2.5)	nd	4 [2]	1/189	1/63
	2005	nd	nd	nd	nd	5 [2]	0/189	0/63
	2006	nd	nd	19	nd	7 [2]	2/192	2/64
	2007	nd	nd	31	nd	10 [4]	2/192	2/64
	2008	nd	nd	nd	nd	1.7 [0.7]	0/192	0/64
	2009	nd	nd	nd	nd	1.4 [0.6]	0/192	0/64
	2010	nd	nd	4	nd	3 [1]	1/64	1/64

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Wildlife>

Heptachlor: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 5 of the 7 valid areas adopting the detection limit of 1pg/g-wet, and none of the detected concentrations exceeded 78 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at 12 of the 18 valid areas adopting the detection limit of 1pg/g-wet, and none of the detected concentrations exceeded 5 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at 1 of the 2 valid areas adopting the detection limit of 1pg/g-wet, and none of the detected concentrations exceeded tr(1) pg/g-wet.

cis-heptachlor epoxide: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 0.9pg/g-wet, and the detection range was 9.0～1,800 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 0.9pg/g-wet, and the detection range was 5.0～230 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 0.9pg/g-wet, and the detection range was 240～360 pg/g-wet.

trans-heptachlor epoxide: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 3 of the 7 valid areas adopting the detection limit of 1pg/g-wet, and none of the detected concentrations exceeded 24 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was not detected at all 18 valid areas adopting the detection limit of 1pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was not detected at all 18 valid areas adopting the detection limit of 1pg/g-wet.

Stocktaking of the detection of heptachlor in wildlife (bivalves, fish and birds) during FY2002~2010

Heptachlor	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	tr(3.5)	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(3.4)	5.2	16	nd	4.1 [1.4]	23/31	6/7
	2005	tr(2.9)	tr(2.9)	24	nd	6.1 [2.0]	18/31	6/7
	2006	tr(4)	tr(4)	20	nd	6 [2]	23/31	6/7
	2007	tr(3)	tr(3)	12	nd	6 [2]	20/31	6/7
	2008	tr(2)	nd	9	nd	6 [2]	13/31	5/7
	2009	tr(4)	nd	120	nd	5 [2]	14/31	4/7
	2010	3	tr(2)	78	nd	3 [1]	5/6	5/6
Fish (pg/g-wet)	2002	4.2	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(2.3)	tr(2.1)	460	nd	4.1 [1.4]	50/70	11/14
	2005	nd	nd	7.6	nd	6.1 [2.0]	32/80	8/16
	2006	tr(2)	nd	8	nd	6 [2]	36/80	8/16
	2007	tr(2)	nd	7	nd	6 [2]	28/80	6/16
	2008	nd	nd	9	nd	6 [2]	25/85	7/17
	2009	tr(2)	nd	8	nd	5 [2]	30/90	11/18
	2010	tr(2)	tr(2)	5	nd	3 [1]	12/18	12/18
Birds (pg/g-wet)	2002	tr(1.7)	tr(2.8)	5.2	nd	4.2 [1.4]	7/10	2/2
	2003	nd	nd	nd	nd	6.6 [2.2]	0/10	0/2
	2004	nd	nd	tr(1.5)	nd	4.1 [1.4]	1/10	1/2
	2005	nd	nd	nd	nd	6.1 [2.0]	0/10	0/2
	2006	nd	nd	nd	nd	6 [2]	0/10	0/2
	2007	nd	nd	nd	nd	6 [2]	0/10	0/2
	2008	nd	nd	nd	nd	6 [2]	0/10	0/2
	2009	nd	nd	nd	nd	5 [2]	0/10	0/2
	2010	nd	nd	tr(1)	nd	3 [1]	1/2	1/2

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

Stocktaking of the detection of *cis*-heptachlor epocide in wildlife (bivalves, fish and birds) during FY2002~2010

cis-Heptachlor epoxide	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Bivalves (pg/g-wet)	2003	44	29	880	9.7	6.9 [2.3]	30/30	6/6
	2004	64	34	840	tr(9.8)	9.9 [3.3]	31/31	7/7
	2005	49	20	590	7.4	3.5 [1.2]	31/31	7/7
	2006	56	23	1,100	8	4 [1]	31/31	7/7
	2007	37	20	1,100	8	4 [1]	31/31	7/7
	2008	37	19	510	8	5 [2]	31/31	7/7
	2009	59	33	380	10	3 [1]	31/31	7/7
	2010	170	260	1,800	9.0	2.4 [0.9]	6/6	6/6
Fish (pg/g-wet)	2003	43	43	320	7.0	6.9 [2.3]	70/70	14/14
	2004	51	49	620	tr(3.3)	9.9 [3.3]	70/70	14/14
	2005	41	45	390	4.9	3.5 [1.2]	80/80	16/16
	2006	42	48	270	4	4 [1]	80/80	16/16
	2007	43	49	390	4	4 [1]	80/80	16/16
	2008	39	46	350	tr(3)	5 [2]	85/85	17/17
	2009	41	50	310	4	3 [1]	90/90	18/18
	2010	39	49	230	5.0	2.4 [0.9]	18/18	18/18

Stocktaking of the detection of *cis*-heptachlor epocide in wildlife (bivalves, fish and birds) during FY2002~2010

Birds (pg/g-wet)	2003	540	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	370	340	690	250	3.5 [1.2]	10/10	2/2
	2006	330	310	650	240	4 [1]	10/10	2/2
	2007	280	270	350	250	4 [1]	10/10	2/2
	2008	370	370	560	180	5 [2]	10/10	2/2
	2009	220	210	390	160	3 [1]	10/10	2/2
	2010	290	300	360	240	2.4 [0.9]	2/2	2/2

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

Stocktaking of the detection of *trans*-heptachlor epoxide in wildlife (bivalves, fish and birds) during FY2002~2010

trans-Heptachlor epoxide	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Bivalves (pg/g-wet)	2003	nd	nd	48	nd	13 [4.4]	5/30	1/6
	2004	nd	nd	55	nd	12 [4.0]	9/31	2/7
	2005	nd	nd	37	nd	23 [7.5]	5/31	1/7
	2006	nd	nd	45	nd	13 [5]	5/31	1/7
	2007	nd	nd	61	nd	13 [5]	5/31	1/7
	2008	nd	nd	33	nd	10 [4]	5/31	1/7
	2009	tr(3)	nd	24	nd	8 [3]	13/31	3/7
	2010	3	tr(2)	24	nd	3 [1]	3/6	3/6
Fish (pg/g-wet)	2003	nd	nd	nd	nd	13 [4.4]	0/70	0/14
	2004	nd	nd	tr(10)	nd	12 [4.0]	2/70	2/14
	2005	nd	nd	nd	nd	23 [7.5]	0/80	0/16
	2006	nd	nd	nd	nd	13 [5]	0/80	0/16
	2007	nd	nd	nd	nd	13 [5]	0/80	0/16
	2008	nd	nd	nd	nd	10 [4]	0/85	0/17
	2009	nd	nd	nd	nd	8 [3]	0/90	0/18
	2010	nd	nd	nd	nd	3 [1]	0/18	0/18
Birds (pg/g-wet)	2003	nd	nd	nd	nd	13 [4.4]	0/10	0/2
	2004	nd	nd	nd	nd	12 [4.0]	0/10	0/2
	2005	nd	nd	nd	nd	23 [7.5]	0/10	0/2
	2006	nd	nd	nd	nd	13 [5]	0/10	0/2
	2007	nd	nd	nd	nd	13 [5]	0/10	0/2
	2008	nd	nd	nd	nd	10 [4]	0/10	0/2
	2009	nd	nd	nd	nd	8 [3]	0/10	0/2
	2010	nd	nd	nd	nd	3 [1]	0/2	0/2

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Air>

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 0.04pg/m³, and the detection range was 0.69～160 pg/m³. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.04pg/m³, and the detection range was 0.22～53 pg/m³.

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 0.01pg/m³, and the detection range was 0.38～10 pg/m³. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.01pg/m³, and the detection range was 0.33～4.3 pg/m³.

trans-heptachlor epoxide: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at 6 of the 37 valid sites adopting the detection limit of 0.06pg/m³, and none of the detected concentrations exceeded 0.16 pg/gm³. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was not detected at all 37 valid sites adopting the detection limit of 0.06pg/m³.

Stocktaking of the detection of heptachlor*, cis*-heptachlor epocide and *trans*-heptachlor epocide in air during FY2002~2010

Heptachlor	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Air (pg/m³)	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
	2007 Warm season	22	27	320	1.1	0.07 [0.03]	36/36	36/36
	2007 Cold season	6.3	8.0	74	0.42		36/36	36/36
	2008 Warm season	20	31	190	0.92	0.06 [0.02]	37/37	37/37
	2008 Cold season	7.5	12	60	0.51		37/37	37/37
	2009 Warm season	18	30	110	0.48	0.04 [0.01]	37/37	37/37
	2009 Cold season	6.3	7.8	48	0.15		37/37	37/37
	2010 Warm season	17	26	160	0.69	0.11 [0.04]	37/37	37/37
	2010 Cold season	7.2	9.5	53	0.22		37/37	37/37

cis-Heptachlor epoxide	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Air (pg/m³)	2002	3.5	3.5	28	0.45	0.015 [0.0048]	35/35	35/35
	2003 Warm season	1.3	1.3	6.6	0.49		34/34	34/34
	2003 Cold season	2.8	2.9	9.7	0.65	0.052 [0.017]	37/37	37/37
	2004 Warm season	1.1	1.1	7.0	0.44		37/37	37/37
	2004 Cold season	1.5	1.7	11	tr(0.10)	0.12 [0.044]	37/37	37/37
	2005 Warm season	0.91	0.81	2.9	0.43		37/37	37/37
	2005 Cold season	1.7	2.0	6.7	0.13	0.11 [0.04]	37/37	37/37
	2006 Warm season	0.74	0.88	3.2	nd		36/37	36/37
	2006 Cold season	2.9	2.8	13	0.54	0.03 [0.01]	36/36	36/36
	2007 Warm season	0.93	0.82	3.0	0.41		36/36	36/36
	2007 Cold season	2.4	2.2	9.9	0.53	0.022 [0.008]	37/37	37/37
	2008 Warm season	0.91	0.84	3.0	0.37		37/37	37/37
	2008 Cold season	2.5	2.6	16	0.37	0.03 [0.01]	37/37	37/37
	2009 Warm season	1.0	0.91	3.8	0.42		37/37	37/37
	2009 Cold season	2.3	2.3	10	0.38	0.02 [0.01]	37/37	37/37
	2010 Warm season	0.93	0.85	4.3	0.33		37/37	37/37

Stocktaking of the detection of heptachlor, *cis*-heptachlor epocide and *trans*-heptachlor epocide in air during FY2002~2010

trans-Heptachlor epoxide	Monitored year	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
	2007 Warm season	nd	nd	0.16	nd	0.14 [0.06]	8/36	8/36
	2007 Cold season	nd	nd	tr(0.06)	nd		1/36	1/36
	2008 Warm season	nd	nd	0.17	nd	0.16 [0.06]	6/37	6/37
	2008 Cold season	nd	nd	nd	nd		0/37	0/37
	2009 Warm season	nd	nd	0.18	nd	0.14 [0.05]	10/37	10/37
	2009 Cold season	nd	nd	tr(0.06)	nd		1/37	1/37
	2010 Warm season	nd	nd	0.16	nd	0.16 [0.06]	6/37	6/37
	2003 Warm season	nd	nd	nd	nd		0/37	0/37

[9] Toxaphenes (reference)

- History and state of monitoring

Toxaphenes are a group of organochlorine insecticides. No domestic record of manufacture/import of the substances was reported since those were 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 was measured in FY 1983 (in surface water and sediment) under the framework of "the Environmental Survey and Monitoring of Chemicals."

Under the framework of the Environmental Monitoring, Parlar-26, Parlar-50 and Parlar-62 have been monitored in surface water, sediment, wildlife (bivalves, fish and birds) and air since FY 2003.

As of FY 2010, monitoring surveys are conducted bi-annually, that is every other year. No monitoring was conducted in 2010. For reference, the monitoring results up to FY 2009 are given below.

- Monitoring results until FY 2009

○ Parlar-26, Parlar-50, and Parlar-62

<Surface Water>

Stocktaking of the detection of Parlar-26, Parlar-50 and Parlar-62 in surface water during FY2002~2009

Parlar-26	Monitored year	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
	2007	nd	nd	nd	nd	20 [5]	0/48	0/48
	2008	nd	nd	nd	nd	8 [3]	0/48	0/48
	2009	nd	nd	nd	nd	5 [2]	0/49	0/49
Parlar-50	**Monitored year**	**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
	2007	nd	nd	nd	nd	9 [3]	0/48	0/48
	2008	nd	nd	nd	nd	7 [3]	0/48	0/48
	2009	nd	nd	nd	nd	7 [3]	0/49	0/49
Parlar-62	**Monitored year**	**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
	2007	nd	nd	nd	nd	70 [30]	0/48	0/48
	2008	nd	nd	nd	nd	40 [20]	0/48	0/48
	2009	nd	nd	nd	nd	40 [20]	0/49	0/49

<Sediment>

Stocktaking of the detection of Parlar-26, Parlar-50 and Parlar-62 in sediment during FY2002~2009

Parlar-26	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2003	nd	nd	nd	nd	90 [30]	0/186	0/62
	2004	nd	nd	nd	nd	60 [20]	0/189	0/63
	2005	nd	nd	nd	nd	60 [30]	0/189	0/63
	2006	nd	nd	nd	nd	12 [4]	0/192	0/64
	2007	nd	nd	nd	nd	7 [3]	0/192	0/64
	2008	nd	nd	nd	nd	12 [5]	0/192	0/64
	2009	nd	nd	nd	nd	10 [4]	0/192	0/64

Parlar-50	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2003	nd	nd	nd	nd	200 [50]	0/186	0/62
	2004	nd	nd	nd	nd	60 [20]	0/189	0/63
	2005	nd	nd	nd	nd	90 [40]	0/189	0/63
	2006	nd	nd	nd	nd	24 [7]	0/192	0/64
	2007	nd	nd	nd	nd	30 [10]	0/192	0/64
	2008	nd	nd	nd	nd	17 [6]	0/192	0/64
	2009	nd	nd	nd	nd	12 [5]	0/192	0/64

Parlar-62	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2003	nd	nd	nd	nd	4,000 [2,000]	0/186	0/62
	2004	nd	nd	nd	nd	2,000 [400]	0/189	0/63
	2005	nd	nd	nd	nd	2,000 [700]	0/189	0/63
	2006	nd	nd	nd	nd	210 [60]	0/192	0/64
	2007	nd	nd	nd	nd	300 [70]	0/192	0/64
	2008	nd	nd	nd	nd	90 [40]	0/192	0/64
	2009	nd	nd	nd	nd	80 [30]	0/192	0/64

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2003~FY2009.

<Wildlife>

Stocktaking of the detection of Parlar-26 in wildlife (bivalves, fish and birds) during FY2002~2009

Parlar-26	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Bivalves (pg/g-wet)	2003	nd	nd	tr(39)	nd	45 [15]	11/30	3/6
	2004	nd	nd	tr(32)	nd	42 [14]	15/31	3/7
	2005	nd	nd	tr(28)	nd	47 [16]	7/31	4/7
	2006	tr(9)	tr(12)	25	nd	18 [7]	21/31	5/7
	2007	tr(7)	tr(8)	20	nd	10 [4]	26/31	6/7
	2008	tr(7)	tr(8)	22	nd	9 [3]	27/31	7/7
	2009	9	9	23	nd	7 [3]	27/31	7/7
Fish (pg/g-wet)	2003	tr(28)	tr(24)	810	nd	45 [15]	44/70	11/14
	2004	43	tr(41)	1,000	nd	42 [14]	54/70	13/14
	2005	tr(42)	53	900	nd	47 [16]	50/75	13/16
	2006	41	44	880	nd	18 [7]	70/80	15/16
	2007	24	32	690	nd	10 [4]	64/80	14/16
	2008	35	33	730	nd	9 [3]	79/85	17/17
	2009	25	20	690	nd	7 [3]	82/90	18/18
Birds (pg/g-wet)	2003	120	650	2,500	nd	45 [15]	5/10	1/2
	2004	70	340	810	nd	42 [14]	5/10	1/2
	2005	86	380	1,200	nd	47 [16]	5/10	1/2
	2006	48	290	750	nd	18 [7]	5/10	1/2
	2007	34	280	650	nd	10 [4]	5/10	1/2
	2008	38	320	1,200	nd	9 [3]	6/10	2/2
	2009	26	200	500	nd	7 [3]	6/10	2/2

Stocktaking of the detection of Parlar-50 in wildlife (bivalves, fish and birds) during FY2002~2009

Parlar-50	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Bivalves (pg/g-wet)	2003	tr(12)	tr(12)	58	nd	33 [11]	17/30	4/6
	2004	tr(15)	nd	tr(45)	nd	46 [15]	15/31	3/7
	2005	nd	nd	tr(38)	nd	54 [18]	9/31	4/7
	2006	tr(10)	14	32	nd	14 [5]	24/31	6/7
	2007	9	10	37	nd	9 [3]	27/31	7/7
	2008	tr(7)	tr(6)	23	nd	10 [4]	23/31	6/7
	2009	9	9	31	nd	8 [3]	27/31	7/7
Fish (pg/g-wet)	2003	35	34	1,100	nd	33 [11]	55/70	14/14
	2004	60	61	1,300	nd	46 [15]	59/70	14/14
	2005	tr(52)	66	1,400	nd	54 [18]	55/80	13/16
	2006	56	52	1,300	nd	14 [5]	79/80	16/16
	2007	35	41	1,100	nd	9 [3]	77/80	16/16
	2008	44	45	1,000	nd	10 [4]	77/85	17/17
	2009	30	23	910	nd	8 [3]	85/90	18/18
Birds (pg/g-wet)	2003	110	850	3,000	nd	33 [11]	5/10	1/2
	2004	83	440	1,000	nd	46 [15]	5/10	1/2
	2005	100	480	1,500	nd	54 [18]	5/10	1/2
	2006	46	380	1,000	nd	14 [5]	5/10	1/2
	2007	34	360	930	nd	9 [3]	5/10	1/2
	2008	49	410	1,600	nd	10 [4]	5/10	1/2
	2009	29	250	620	nd	8 [3]	5/10	1/2

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2003~FY2009.

Stocktaking of the detection of Parlar-62 in wildlife (bivalves, fish and birds) during FY2002~2009

Parlar-62	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Bivalves (pg/g-wet)	2003	nd	nd	nd	nd	120 [40]	0/30	0/6
	2004	nd	nd	nd	nd	98 [33]	0/31	0/7
	2005	nd	nd	nd	nd	100 [34]	0/31	0/7
	2006	nd	nd	nd	nd	70 [30]	0/31	0/7
	2007	nd	nd	nd	nd	70 [30]	0/31	0/7
	2008	nd	nd	nd	nd	80 [30]	0/31	0/7
	2009	nd	nd	nd	nd	70 [20]	0/31	0/7
Fish (pg/g-wet)	2003	nd	nd	580	nd	120 [40]	9/70	3/14
	2004	nd	nd	870	nd	98 [33]	24/70	7/14
	2005	nd	nd	830	nd	100 [34]	23/80	8/16
	2006	tr(30)	nd	870	nd	70 [30]	28/80	10/16
	2007	tr(30)	nd	530	nd	70 [30]	22/80	7/16
	2008	tr(30)	nd	590	nd	80 [30]	31/85	8/17
	2009	tr(20)	nd	660	nd	70 [20]	24/90	8/18
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(78)	130	460	nd	100 [34]	5/10	1/2
	2006	70	120	430	nd	70 [30]	5/10	1/2
	2007	tr(60)	100	300	nd	70 [30]	5/10	1/2
	2008	tr(70)	130	360	nd	80 [30]	5/10	1/2
	2009	tr(40)	80	210	nd	70 [20]	5/10	1/2

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2003~FY2009.

<Air>

Stocktaking of the detection of Parlar-26, Parlar-50 and Parlar-62 in air during FY2002~2009

Parlar-26	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
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
	2007 Warm season	nd	nd	tr(0.3)	nd	0.6 [0.2]	18/36	18/36
	2007 Cold season	nd	nd	nd	nd		0/36	0/36
	2008 Warm season	tr(0.21)	0.22	0.58	tr(0.12)	0.22 [0.08]	37/37	37/37
	2008 Cold season	tr(0.11)	tr(0.12)	tr(0.20)	nd		36/37	36/37
	2009 Warm season	tr(0.18)	tr(0.19)	0.26	tr(0.11)	0.23 [0.09]	37/37	37/37
	2009 Cold season	tr(0.12)	tr(0.13)	0.27	nd		33/37	33/37

Parlar-50	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
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
	2007 Warm season	nd	tr(0.1)	tr(0.2)	nd	0.3 [0.1]	29/36	29/36
	2007 Cold season	nd	nd	nd	nd		0/36	0/36
	2008 Warm season	nd	nd	tr(0.19)	nd	0.25 [0.09]	15/37	15/37
	2008 Cold season	nd	nd	nd	nd		0/37	0/37
	2009 Warm season	nd	nd	tr(0.1)	nd	0.3 [0.1]	11/37	11/37
	2009 Cold season	nd	nd	tr(0.1)	nd		1/37	1/37

Parlar-62	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
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
	2007 Warm season	nd	nd	nd	nd	1.5 [0.6]	0/36	0/36
	2007 Cold season	nd	nd	nd	nd		0/36	0/36
	2008 Warm season	nd	nd	nd	nd	1.6 [0.6]	0/37	0/37
	2008 Cold season	nd	nd	nd	nd		0/37	0/37
	2009 Warm season	nd	nd	nd	nd	1.6 [0.6]	0/37	0/37
	2009 Cold season	nd	nd	nd	nd		0/37	0/37

[10] Mirex (reference)

・ History and state of monitoring

Mirex was developed as an organochlorine insecticide chemical in the United States, and it was 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. The substance was designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in September 2002.

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."

Under the framework of the Environmental Monitoring, Mirex has been monitored in surface water, sediment, wildlife (bivalves, fish and birds) and air since FY 2003.

As of FY 2010, monitoring surveys are conducted bi-annually, that is every other year. No monitoring was conducted in 2010. For reference, the monitoring results up to FY 2009 are given below.

・ Monitoring results until FY 2009

<Surface Water>

Stocktaking of the detection of mirex in surface water during FY2002~2009

Mirex	Monitored year	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
	2007	nd	nd	tr(0.5)	nd	1.1 [0.4]	2/48	2/48
	2008	nd	nd	0.7	nd	0.6 [0.2]	4/48	4/48
	2009	nd	nd	0.5	nd	0.4 [0.2]	8/49	8/49

<Sediment>

Stocktaking of the detection of mirex in sediment during FY2002~2009

Mirex	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2003	2	tr(1.6)	1,500	nd	2 [0.4]	137/186	51/62
	2004	2	tr(1.6)	220	nd	2 [0.5]	153/189	55/63
	2005	1.8	1.2	5,300	nd	0.9 [0.3]	134/189	48/63
	2006	1.7	1.2	640	nd	0.6 [0.2]	156/192	57/64
	2007	1.5	0.9	200	nd	0.9 [0.3]	147/192	55/64
	2008	1.4	1.1	820	nd	0.7 [0.3]	117/192	48/64
	2009	1.4	1.3	620	nd	1.0 [0.4]	126/192	49/64

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2003~FY2009.

<Wildlife>

Stocktaking of the detection of mirex in wildlife (bivalves, fish and birds) during FY2002~2009

Mirex	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Bivalves (pg/g-wet)	2003	4.9	4.2	19	tr(1.6)	2.4 [0.81]	30/30	6/6
	2004	4.4	4.3	12	tr(1.1)	2.5 [0.82]	31/31	7/7
	2005	5.4	5.2	20	tr(1.9)	3.0 [0.99]	31/31	7/7
	2006	5	4	19	tr(2)	3 [1]	31/31	7/7
	2007	5	4	18	tr(2)	3 [1]	31/31	7/7
	2008	4	tr(3)	18	tr(2)	4 [1]	31/31	7/7
	2009	5.9	5.2	21	tr(1.7)	2.1 [0.8]	31/31	7/7
Fish (pg/g-wet)	2003	8.3	9.0	25	tr(1.7)	2.4 [0.81]	70/70	14/14
	2004	13	11	180	3.8	2.5 [0.82]	70/70	14/14
	2005	13	13	78	tr(1.0)	3.0 [0.99]	80/80	16/16
	2006	11	10	53	tr(2)	3 [1]	80/80	16/16
	2007	9	11	36	tr(1)	3 [1]	80/80	16/16
	2008	11	13	48	tr(1)	4 [1]	85/85	17/17
	2009	8.6	9.6	37	tr(0.9)	2.1 [0.8]	90/90	18/18
Birds (pg/g-wet)	2003	120	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	77	66	180	41	3.0 [0.99]	10/10	2/2
	2006	77	70	280	39	3 [1]	10/10	2/2
	2007	57	59	100	32	3 [1]	10/10	2/2
	2008	74	68	260	27	4 [1]	10/10	2/2
	2009	49	50	79	32	2.1 [0.8]	10/10	2/2

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2003~FY2009.

<Air>

Stocktaking of the detection of mirex in air during FY2002~2009

Mirex	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency 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
	2007 Warm season	0.11	0.11	0.28	0.04	0.03 [0.01]	36/36	36/36
	2007 Cold season	0.04	0.04	0.09	tr(0.02)		36/36	36/36
	2008 Warm season	0.09	0.09	0.25	0.03	0.03 [0.01]	37/37	37/37
	2008 Cold season	0.05	0.04	0.08	0.03		37/37	37/37
	2009 Warm season	0.12	0.13	0.48	0.049	0.015 [0.006]	37/37	37/37
	2009 Cold season	0.058	0.054	0.18	0.030		37/37	37/37

[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. *α*-HCH, *β*-HCH, and *γ*-HCH (synonym:Lindane) were adopted as target chemicals at the COP4 of the Stockholm convention on Persistent Organic Pollutants in May 2009.

Among many HCH isomers, *α*-HCH, *β*-HCH, *γ*-HCH (synonym: Lindane) 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 (synonym:Lindane) and *δ*-HCH had not been monitored since FY 1997 and FY 1993, respectively.)

Under the framework of the Environmental Monitoring, *α*-HCH and *β*-HCH have been monitored in surface water, sediment, and wildlife (bivalves, fish and birds) since FY 2002. *α*-HCH and *β*-HCH have also been monitored in air, and *γ*-HCH (synonym:Lindane) and *δ*-HCH have been monitored in surface water, sediment, wildlife (bivalves, fish and birds) and air since FY 2003.

・ Monitoring results

○ *α*-HCH, *β*-HCH, *γ*-HCH (synonym:Lindane) and *δ*-HCH

<Surface Water>

α-HCH: The presence of the substance in surface water was monitored at 49 sites, and it was detected at all 49 valid sites adopting the detection limit of 1pg/L, and the detection range was 14～1,400 pg/L.

β-HCH: The presence of the substance in surface water was monitored at 49 sites, and it was detected at all 49 valid sites adopting the detection limit of 0.7pg/L, and the detection range was 33～2,500 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from lake areas were identified as statistically significant

γ-HCH(synonym:Lindane): The presence of the substance in surface water was monitored at 49 sites, and it was detected at all 49 valid sites adopting the detection limit of 2pg/L, and the detection range was tr(5)～190 pg/L. As results of the inter-annual trend analysis from FY 2003 to FY 2010, reduction tendencies in specimens from river areas, river mouth areas and sea areas were identified as statistically significant and reduction tendency in specimens from the overall areas was also identified as statistically significant.

δ-HCH: The presence of the substance in surface water was monitored at 49 sites, and it was detected at all 49 valid sites adopting the detection limit of 0.3pg/L, and the detection range was 0.9～780 pg/L.

Stocktaking of the detection of α-HCH, β-HCH, γ-HCH (synonym: Lindane) and δ-HCH in surface water during FY2002~2010

α-HCH	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2002	86	76	6,500	1.9	0.9 [0.3]	114/114	38/38
	2003	120	120	970	13	3 [0.9]	36/36	36/36
	2004	150	145	5,700	13	6 [2]	38/38	38/38
	2005	90	81	660	16	4 [1]	47/47	47/47
	2006	110	90	2,100	25	3 [1]	48/48	48/48
	2007	76	73	720	13	1.9 [0.6]	48/48	48/48
	2008	78	75	1,100	9	4 [2]	48/48	48/48
	2009	74	73	560	14	1.2 [0.4]	49/49	49/49
	2010	94	75	1,400	14	4 [1]	49/49	49/49
β-HCH	**Monitored year**	**Geometric mean***	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**Detection Frequency Sample**	**Detection Frequency Site**
Surface Water (pg/L)	2002	210	180	1,600	24	0.9 [0.3]	114/114	38/38
	2003	250	240	1,700	14	3 [0.7]	36/36	36/36
	2004	260	250	3,400	31	4 [2]	38/38	38/38
	2005	200	170	2,300	25	2.6 [0.9]	47/47	47/47
	2006	200	160	2,000	42	1.7 [0.6]	48/48	48/48
	2007	170	150	1,300	18	2.7[0.9]	48/48	48/48
	2008	150	150	1,800	15	1.0 [0.4]	48/48	48/48
	2009	150	150	1,100	18	0.6 [0.2]	49/49	49/49
	2010	180	160	2,500	33	2.0 [0.7]	49/49	49/49
γ-HCH (synonym: Lindane)	**Monitored year**	**Geometric mean***	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**Detection Frequency Sample**	**Detection Frequency Site**
Surface Water (pg/L)	2003	92	90	370	32	7 [2]	36/36	36/36
	2004	91	76	8,200	21	20 [7]	38/38	38/38
	2005	48	40	250	tr(8)	14 [5]	47/47	47/47
	2006	44	43	460	tr(9)	18 [6]	48/48	48/48
	2007	34	32	290	5.2	2.1 [0.7]	48/48	48/48
	2008	34	32	340	4	3 [1]	48/48	48/48
	2009	32	26	280	5.1	0.6 [0.2]	49/49	49/49
	2010	26	22	190	tr(5)	6 [2]	49/49	49/49
δ-HCH	**Monitored year**	**Geometric mean***	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**DetectionFrequency Sample**	**DetectionFrequency Site**
Surface Water (pg/L)	2003	14	14	200	tr(1.1)	2 [0.5]	36/36	36/36
	2004	24	29	670	tr(1.4)	2 [0.7]	38/38	38/38
	2005	1.8	nd	62	nd	1.5 [0.5]	23/47	23/47
	2006	24	18	1,000	2.2	2.0 [0.8]	48/48	48/48
	2007	11	9.7	720	tr(0.7)	1.2 [0.4]	48/48	48/48
	2008	11	10	1,900	tr(1.1)	2.3 [0.9]	48/48	48/48
	2009	10	11	450	tr(0.7)	0.9 [0.4]	49/49	49/49
	2010	16	17	780	0.9	0.8 [0.3]	49/49	49/49

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2002.

<Sediment>

α-HCH: 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 0.8pg/g-dry, and the detection range was 3.1～3,700 pg/g-dry.

β-HCH: 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 0.8pg/g-dry, and the detection range was 11～8,200 pg/g-dry. As results of the inter-annual trend analysis from FY 2002 to FY 2010, reduction tendencies in specimens from lake areas were identified as statistically significant *γ*-HCH(synonym:Lindane): 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 0.7pg/g-dry, and the detection range was tr(1.5)～2,300 pg/g-dry. As results of the inter-annual trend analysis from FY 2003 to FY 2010, reduction tendencies in specimens from lake areas were identified as statistically significant

δ-HCH: 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 0.5pg/g-dry, and the detection range was 1.3～3,800 pg/g-dry.

Stocktaking of the detection of *α*-HCH, *β*-HCH, *γ*-HCH (synonym: Lindane) and *δ*-HCH in sediment during FY2002~2010

α-HCH	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	150	170	8,200	2.0	1.2 [0.4]	189/189	63/63
	2003	160	170	9,500	2	2 [0.5]	186/186	62/62
	2004	160	180	5,700	tr(1.5)	2 [0.6]	189/189	63/63
	2005	140	160	7,000	3.4	1.7 [0.6]	189/189	63/63
	2006	140	160	4,300	tr(2)	5 [2]	192/192	64/64
	2007	140	150	12,000	tr(1.3)	1.8 [0.6]	192/192	64/64
	2008	140	190	5,200	nd	1.6 [0.6]	191/192	64/64
	2009	120	120	6,300	nd	1.1 [0.4]	191/192	64/64
	2010	140	140	3,700	3.1	2.0 [0.8]	64/64	64/64
β-HCH	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2002	230	230	11,000	3.9	0.9 [0.3]	189/189	63/63
	2003	250	220	39,000	5	2 [0.7]	186/186	62/62
	2004	240	230	53,000	4	3 [0.8]	189/189	63/63
	2005	200	220	13,000	3.9	2.6 [0.9]	189/189	63/63
	2006	190	210	21,000	2.3	1.3 [0.4]	192/192	64/64
	2007	200	190	59,000	1.6	0.9 [0.3]	192/192	64/64
	2008	190	200	8,900	2.8	0.8 [0.3]	192/192	64/64
	2009	180	170	10,000	2.4	1.3 [0.5]	192/192	64/64
	2010	230	210	8,200	11	2.4 [0.8]	64/64	64/64
γ-HCH (synonym: Lindane)	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2003	51	47	4,000	tr(1.4)	2 [0.4]	186/186	62/62
	2004	53	48	4,100	tr(0.8)	2 [0.5]	189/189	63/63
	2005	49	46	6,400	tr(1.8)	2.0 [0.7]	189/189	63/63
	2006	48	49	3,500	tr(1.4)	2.1 [0.7]	192/192	64/64
	2007	42	41	5,200	tr(0.6)	1.2 [0.4]	192/192	64/64
	2008	40	43	2,200	tr(0.7)	0.9 [0.4]	192/192	64/64
	2009	38	43	3,800	nd	0.6 [0.2]	191/192	64/64
	2010	35	30	2,300	tr(1.5)	2.0 [0.7]	64/64	64/64
δ-HCH	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment (pg/g-dry)	2003	42	46	5,400	nd	2 [0.7]	180/186	61/62
	2004	55	55	5,500	tr(0.5)	2 [0.5]	189/189	63/63
	2005	52	63	6,200	nd	1.0 [0.3]	188/189	63/63
	2006	45	47	6,000	nd	1.7 [0.6]	189/192	64/64
	2007	26	28	5,400	nd	5 [2]	165/192	60/64
	2008	41	53	3,300	nd	2 [1]	186/192	64/64
	2009	36	37	5,000	nd	1.2 [0.5]	190/192	64/64
	2010	39	40	3,800	1.3	1.2 [0.5]	64/64	64/64

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Wildlife>

α-HCH: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 13～730 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was tr(1)～250 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 160～430 pg/g-wet.

β-HCH: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 27～1,500 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 5～760 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 910～2,800 pg/g-wet.

γ-HCH(synonym:Lindane): The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 5～150 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was tr(1)～56 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 4～23 pg/g-wet. As results of the inter-annual trend analysis from FY 2003 to FY 2010, reduction tendencies in specimens from bivalves and fish were identified as statistically significant.

δ-HCH: The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 5 of the 7 valid areas adopting the detection limit of 1pg/g-wet, and none of the detected concentrations exceeded 870 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at 13 of the 18 valid areas adopting the detection limit of 1pg/g-wet, and none of the detected concentrations exceeded 36 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 1pg/g-wet, and the detection range was 11～13 pg/g-wet.

Stocktaking of the detection of α-HCH in wildlife (bivalves, fish and birds) during FY2002~2010

α-HCH	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	67	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	56	25	1,800	tr(12)	13 [4.3]	31/31	7/7
	2005	38	25	1,100	tr(7.1)	11 [3.6]	31/31	7/7
	2006	30	21	390	6	3 [1]	31/31	7/7
	2007	31	17	1,400	8	7 [2]	31/31	7/7
	2008	26	16	380	7	6 [2]	31/31	7/7
	2009	45	21	2,200	9	5 [2]	31/31	7/7
	2010	35	20	730	13	3 [1]	6/6	6/6

Stocktaking of the detection of α-HCH in wildlife (bivalves, fish and birds) during FY2002~2010

Fish (pg/g-wet)	2002	57	56	590	tr(1.9)	4.2 [1.4]	70/70	14/14
	2003	43	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	42	43	1,000	nd	11 [3.6]	75/80	16/16
	2006	44	53	360	tr(2)	3 [1]	80/80	16/16
	2007	39	40	730	tr(2)	7 [2]	80/80	16/16
	2008	36	47	410	nd	6 [2]	84/85	17/17
	2009	39	32	830	tr(2)	5 [2]	90/90	18/18
	2010	27	39	250	tr(1)	3 [1]	18/18	18/18
Birds (pg/g-wet)	2002	170	130	360	93	4.2 [1.4]	10/10	2/2
	2003	73	74	230	30	1.8 [0.61]	10/10	2/2
	2004	190	80	1,600	58	13 [4.3]	10/10	2/2
	2005	76	77	85	67	11 [3.6]	10/10	2/2
	2006	76	75	100	55	3 [1]	10/10	2/2
	2007	75	59	210	43	7 [2]	10/10	2/2
	2008	48	48	61	32	6 [2]	10/10	2/2
	2009	43	42	56	34	5 [2]	10/10	2/2
	2010	260	---	430	160	3 [1]	2/2	2/2

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

Stocktaking of the detection of β-HCH in wildlife (bivalves, fish and birds) during FY2002~2010

β-HCH	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Bivalves (pg/g-wet)	2002	88	62	1,700	32	12 [4]	38/38	8/8
	2003	78	50	1,100	23	9.9 [3.3]	30/30	6/6
	2004	100	74	1,800	22	6.1 [2.0]	31/31	7/7
	2005	85	56	2,000	20	2.2 [0.75]	31/31	7/7
	2006	81	70	880	11	3 [1]	31/31	7/7
	2007	79	56	1,800	21	7 [3]	31/31	7/7
	2008	73	51	1,100	23	6 [2]	31/31	7/7
	2009	83	55	1,600	27	6 [2]	31/31	7/7
	2010	89	56	1,500	27	3 [1]	6/6	6/6
Fish (pg/g-wet)	2002	110	120	1,800	tr(5)	12 [4]	70/70	14/14
	2003	81	96	1,100	tr(3.5)	9.9 [3.3]	70/70	14/14
	2004	110	140	1,100	tr(3.9)	6.1 [2.0]	70/70	14/14
	2005	95	110	1,300	6.7	2.2 [0.75]	80/80	16/16
	2006	89	110	1,100	4	3 [1]	80/80	16/16
	2007	110	120	810	7	7 [3]	80/80	16/16
	2008	94	150	750	tr(4)	6 [2]	85/85	17/17
	2009	98	130	970	tr(5)	6 [2]	90/90	18/18
	2010	81	110	760	5	3 [1]	18/18	18/18
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	2,300	2,100	4,800	1,100	6.1 [2.0]	10/10	2/2
	2005	2,500	2,800	6,000	930	2.2 [0.75]	10/10	2/2
	2006	2,100	2,400	4,200	1,100	3 [1]	10/10	2/2
	2007	2,000	1,900	3,200	1,400	7 [3]	10/10	2/2
	2008	2,400	2,000	5,600	1,300	6 [2]	10/10	2/2
	2009	1,600	1,400	4,200	870	6 [2]	10/10	2/2
	2010	1,600	---	2,800	910	3 [1]	2/2	2/2

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

Stocktaking of the detection of γ-HCH (synonym: Lindane) in wildlife (bivalves, fish and birds) during FY2002~2010

γ-HCH (synonym:Lindane)	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Bivalves (pg/g-wet)	2003	19	18	130	5.2	3.3 [1.1]	30/30	6/6
	2004	tr(24)	tr(16)	230	nd	31 [10]	28/31	7/7
	2005	23	13	370	tr(5.7)	8.4 [2.8]	31/31	7/7
	2006	18	12	140	7	4 [2]	31/31	7/7
	2007	16	10	450	tr(4)	9 [3]	31/31	7/7
	2008	12	10	98	tr(3)	9 [3]	31/31	7/7
	2009	14	12	89	tr(3)	7 [3]	31/31	7/7
	2010	14	9	150	5	3 [1]	6/6	6/6
Fish (pg/g-wet)	2003	16	22	130	tr(1.7)	3.3 [1.1]	70/70	14/14
	2004	tr(28)	tr(24)	660	nd	31 [10]	55/70	11/14
	2005	17	17	230	nd	8.4 [2.8]	78/80	16/16
	2006	19	22	97	tr(2)	4 [2]	80/80	16/16
	2007	15	15	190	nd	9 [3]	71/80	15/16
	2008	13	16	96	nd	9 [3]	70/85	15/17
	2009	14	12	180	nd	7 [3]	81/90	17/18
	2010	9	13	56	tr(1)	3 [1]	18/18	18/18
Birds (pg/g-wet)	2003	14	19	40	3.7	3.3 [1.1]	10/10	2/2
	2004	64	tr(21)	1,200	tr(11)	31 [10]	10/10	2/2
	2005	18	20	32	9.6	8.4 [2.8]	10/10	2/2
	2006	16	17	29	8	4 [2]	10/10	2/2
	2007	21	14	140	tr(8)	9 [3]	10/10	2/2
	2008	12	14	19	tr(5)	9 [3]	10/10	2/2
	2009	11	11	21	tr(6)	7 [3]	10/10	2/2
	2010	10	---	23	4	3 [1]	2/2	2/2

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

δ-HCH	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Bivalves (pg/g-wet)	2003	7.4	tr(2.6)	1,300	nd	3.9 [1.3]	29/30	6/6
	2004	6.3	tr(2.1)	1,500	nd	4.6 [1.5]	25/31	6/7
	2005	5.4	tr(2.1)	1,600	nd	5.1 [1.7]	23/31	6/7
	2006	6	tr(2)	890	tr(1)	3 [1]	31/31	7/7
	2007	4	nd	750	nd	4 [2]	12/31	4/7
	2008	tr(3)	nd	610	nd	6 [2]	7/31	3/7
	2009	tr(4)	nd	700	nd	5 [2]	14/31	4/7
	2010	4	tr(2)	870	nd	3 [1]	5/6	5/6
Fish (pg/g-wet)	2003	tr(3.6)	4.0	16	nd	3.9 [1.3]	59/70	13/14
	2004	tr(4.2)	tr(3.5)	270	nd	4.6 [1.5]	54/70	11/14
	2005	tr(3.2)	tr(3.1)	32	nd	5.1 [1.7]	55/80	12/16
	2006	4	3	35	nd	3 [1]	72/80	16/16
	2007	tr(3)	tr(2)	31	nd	4 [2]	42/80	10/16
	2008	tr(4)	tr(3)	77	nd	6 [2]	54/85	12/17
	2009	tr(3)	tr(3)	18	nd	5 [2]	57/90	13/18
	2010	tr(2)	tr(2)	36	nd	3 [1]	13/18	13/18
Birds (pg/g-wet)	2003	19	18	31	12	3.9 [1.3]	10/10	2/2
	2004	30	14	260	6.4	4.6 [1.5]	10/10	2/2
	2005	16	15	30	10	5.1 [1.7]	10/10	2/2
	2006	13	12	21	9	3 [1]	10/10	2/2
	2007	12	10	22	4	4 [2]	10/10	2/2
	2008	9	8	31	tr(3)	6 [2]	10/10	2/2
	2009	5	6	9	tr(3)	5 [2]	10/10	2/2
	2010	12	---	13	11	3 [1]	2/2	2/2

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived during FY2002 ~FY2009.

<Air>

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 0.47pg/m^3, and the detection range was 14～280 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.47pg/m^3, and the detection range was 6.8～410 pg/m^3.

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 0.09pg/m^3, and the detection range was 0.89～34 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.09pg/m^3, and the detection range was tr(0.26)～29 pg/m^3.

γ-HCH(synonym: Lindane): 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 0.12pg/m^3, and the detection range was 2.3～66 pg/m^3.For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.12pg/m^3, and the detection range was 1.1～60 pg/m^3.

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 0.02pg/m^3, and the detection range was 0.11～25 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.02pg/m^3, and the detection range was 0.05～22 pg/m^3.

In addition, it was found that there were some problems in collection of HCHs because of some parts of the air sampler that was used between FY2003 and FY2008 were contaminated by HCHs and affected monitored concentration. Therefore all samples in the air were recognized as undetectable in calculation of data for that period.

Stocktaking of the detection of α-HCH, β-HCH, γ-HCH (synonym: Lindane) and δ-HCH in air during FY2009~2010

α-HCH	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Air (pg/m^3)	2009 Warm season	58	58	340	19	0.12 [0.05]	37/37	37/37
	2009 Cold season	21	18	400	7.8		37/37	37/37
	2010 Warm season	46	51	280	14	1.4 [0.47]	37/37	37/37
	2010 Cold season	19	16	410	6.8		37/37	37/37

β-HCH	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Air (pg/m^3)	2009 Warm season	5.6	5.6	28	0.96	0.09 [0.03]	37/37	37/37
	2009 Cold season	1.8	1.8	24	0.31		37/37	37/37
	2010 Warm season	5.6	6.2	34	0.89	0.27 [0.09]	37/37	37/37
	2010 Cold season	1.7	1.7	29	tr(0.26)		37/37	37/37

γ-HCH (synonym: Lindane)	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Air (pg/m^3)	2009 Warm season	17	19	65	2.9	0.06 [0.02]	37/37	37/37
	2009 Cold season	5.6	4.6	55	1.5		37/37	37/37
	2010 Warm season	14	16	66	2.3	0.35 [0.12]	37/37	37/37
	2010 Cold season	4.8	4.4	60	1.1		37/37	37/37

δ-HCH	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Air (pg/m^3)	2009 Warm season	1.3	1.3	21	0.09	0.04 [0.02]	37/37	37/37
	2009 Cold season	0.36	0.33	20	0.04		37/37	37/37
	2010 Warm season	1.4	1.3	25	0.11	0.05 [0.02]	37/37	37/37
	2010 Cold season	0.38	0.35	22	0.05		37/37	37/37

[12] Chlordecone

・ History and state of monitoring

Chlordecone is a group of organochlorine insecticides. No domestic record of manufacture/import of the substance was reported since it was historically never registrated under the Agricultural Chemicals Regulation Law. Chlordecone was adopted as a target chemical at the Fourth Meeting of the Conference of Parties (COP4) on Stockholm convention on Persistent Organic Pollutants in May 2009.

Under the framework of the Environmental Monitoring, the substance was monitored in surface water, sediment and wildlife (bivalves, fish and birds) in FY 2008.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 49 sites, and it was detected at 13 of the 49 valid sites adopting the detection limit of 0.04pg/L, and none of the detected concentrations exceeded 1.6 pg/L.

Stocktaking of the detection of Chlordecone in surface water during FY2008, 2010

Chlordecone	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Surface Water (pg/L)	2008	nd	nd	0.76	nd	0.14 [0.05]	13/46	13/46
	2010	tr(0.04)	nd	1.6	nd	0.09 [0.04]	13/49	13/49

<Sediment>

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 9 of the 64 valid sites adopting the detection limit of 0.2pg/g-dry, and none of the detected concentrations exceeded 2.8 pg/g-dry.

Stocktaking of the detection of Chlordecone in sediment during FY2008, 2010

Chlordecone	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Sediment (pg/g-dry)	2008	nd	nd	5.8	nd	0.42 [0.16]	23/129	10/49
	2010	nd	nd	2.8	nd	0.4 [0.2]	9/64	9/64

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2008.

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was not detected at all 7 valid areas adopting the detection limit of 2.3pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was not detected at all 18 valid areas adopting the detection limit of 2.3pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was not detected at all 18 valid areas adopting the detection limit of 2.3pg/g-wet.

Stocktaking of the detection of Chlordecone in wildlife during FY2008, 2010

Chlordecone	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Bivalves (pg/g-wet)	2008	nd	nd	nd	nd	5.6 [2.2]	0/31	0/7
	2010	nd	nd	nd	nd	5.9 [2.3]	0/6	0/6
Fish (pg/g-wet)	2008	nd	nd	nd	nd	5.6 [2.2]	0/85	0/17
	2010	nd	nd	nd	nd	5.9 [2.3]	0/18	0/18
Birds (pg/g-wet)	2008	nd	nd	nd	nd	5.6 [2.2]	0/10	0/2
	2010	nd	---	nd	nd	5.9 [2.3]	0/2	0/2

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2008.

<Air>

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 0.02pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was not detected at all 37 valid sites adopting the detection limit of 0.02pg/m^3.

Stocktaking of the detection of Chlordecone in air during FY2008, 2010

Chlordecone	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Air (pg/m^3)	2010 Warm season	nd	nd	nd	nd	0.04 [0.02]	0/37	0/37
	2010 Cold season	nd	nd	nd	nd		0/37	0/37

[13] Hexabromobiphenyls

・ History and state of monitoring

Hexabromobiphenyls have been used as flame retardants for plastics products. Hexabromobiphenyls were adopted as target chemicals at the COP4 of the Stockholm convention on Persistent Organic Pollutants in May 2009 and designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in April 2010.

Under the framework of the Environmental Monitoring, the substance was monitored in surface water, sediment and wildlife (bivalves, fish and birds) in FY 2009.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 49 sites, and it was not detected at all 49 valid sites adopting the detection limit of 1pg/L.

Stocktaking of the detection of Hexabromobiphenyls in surface water during FY2009~2010

Hexabromobiphenyls	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] Limit*	Detection Frequency	
							Sample	Site
Surface Water (pg/L)	2009	nd	nd	nd	nd	5.7 [2.2]	0/49	0/49
	2010	nd	nd	nd	nd	3 [1]	0/49	0/49

(Note) " * " indicates the sum value of the Quantification [Detection] limits of each congener in FY2009.

<Sediment>

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 10 of the 64 valid sites adopting the detection limit of 0.6pg/g-dry, and none of the detected concentrations exceeded 18 pg/g-dry.

Stocktaking of the detection of Hexabromobiphenyls in sediment during FY2009~2010

Hexabromobiphenyls	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] Limit**	Detection Frequency	
							Sample	Site
Sediment (pg/g-dry)	2009	nd	nd	12	nd	1.1 [0.40]	45/190	21/64
	2010	nd	nd	18	nd	1.5 [0.6]	10/64	10/64

(Note 1) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2009.

(Note 2) " ** " indicates the sum value of the Quantification [Detection] limits of each congener in FY2009.

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was not detected at all 7 valid areas adopting the detection limit of **10pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was not detected at all 18 valid areas adopting the detection limit of **10pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was not detected at all 18 valid areas adopting the detection limit of **10pg/g-wet.

Stocktaking of the detection of Hexabromobiphenyls in wildlife (bivalves, fish and birds) during FY2009~2010

Hexabromobiphenyls	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] Limit**	Detection Frequency Sample	Detection Frequency Site
Bivalves (pg/g-wet)	2009	nd	nd	tr(0.53)	nd	1.3 [0.43]	1/31	1/7
	2010	nd	nd	nd	nd	24 [10]	0/6	0/6
Fish (pg/g-wet)	2009	tr(0.49)	tr(0.43)	6.0	nd	1.3 [0.43]	46/90	12/18
	2010	nd	nd	nd	nd	24 [10]	0/18	0/18
Birds (pg/g-wet)	2009	1.6	1.6	2.1	tr(1.2)	1.3 [0.43]	10/10	2/2
	2010	nd	---	nd	nd	24 [10]	0/2	0/2

(Note 1) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2009.

(Note 2) " ** " indicates the sum value of the Quantification [Detection] limits of each congener in FY2009.

<Air>

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 0.1pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was not detected at all 37 valid sites adopting the detection limit of 0.1pg/m^3.

Stocktaking of the detection of Hexabromobiphenyls in wildlife (bivalves, fish and birds) in FY2010

Hexabromo biphenyls	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] Limit	Detection Frequency Sample	Detection Frequency Site
Air (pg/m^3)	2010 Warm season	nd	nd	nd	nd	0.3 [0.1]	0/37	0/37
	2010 Cold season	nd	nd	nd	nd		0/37	0/37

[14] Polybromodiphenyl ethers（Br4～Br10）

・ History and state of monitoring

Polybrominated diphenyl ethers have been used as flame retardants for plastics products. Tetrabromodiphenyl ethers, Pentabromodiphenyl ethers, Hexabromodiphenyl ethers, and Heptabromodiphenyl ethers were adopted as target chemicals at the COP4 of the Stockholm convention on Persistent Organic Pollutants in May 2009.

Under the framework of the Environmental Monitoring, the substance was monitored in wildlife (bivalves, fish and birds) in FY 2008, and in surface water, sediment and wildlife (bivalves, fish and birds) in FY 2009.

・ Monitoring results

○ Tetrabromodiphenyl ethers, Pentabromodiphenyl ethers, Hexabromodiphenyl ethers, Heptabromodiphenyl ethers, Octabromodiphenyl ethers, Nonabromodiphenyl ethers and Decabromodiphenyl ether

<Surface Water>

Tetrabromodiphenyl ethers: The presence of the substance in surface water was monitored at 49 sites, and it was detected at 17 of the 49 valid sites adopting the detection limit of 3pg/L, and none of the detected concentrations exceeded 390 pg/L.

Pentabromodiphenyl ethers: The presence of the substance in surface water was monitored at 49 sites, and it was detected at 25 of the 49 valid sites adopting the detection limit of 1pg/L, and none of the detected concentrations exceeded 130 pg/L.

Hexabromodiphenyl ethers: The presence of the substance in surface water was monitored at 49 sites, and it was detected at 16 of the 49 valid sites adopting the detection limit of 2pg/L, and none of the detected concentrations exceeded 51 pg/L.

Heptabromodiphenyl ethers: The presence of the substance in surface water was monitored at 49 sites, and it was detected at 17 of the 49 valid sites adopting the detection limit of 1pg/L, and none of the detected concentrations exceeded 14 pg/L.

Octabromodiphenyl ethers: The presence of the substance in surface water was monitored at 49 sites, and it was detected at 40 of the 49 valid sites adopting the detection limit of 1pg/L, and none of the detected concentrations exceeded 69 pg/L.

Nonabromodiphenyl ethers: The presence of the substance in surface water was monitored at 49 sites, and it was detected at 39 of the 49 valid sites adopting the detection limit of 7pg/L, and none of the detected concentrations exceeded 620 pg/L.

Decabromodiphenyl ether: The presence of the substance in surface water was monitored at 49 sites, and it was detected at 31 of the 49 valid sites adopting the detection limit of 100pg/L, and none of the detected concentrations exceeded 13,000 pg/L.

Stocktaking of the detection of Polybromodiphenyl ethers (Br4～Br10) in surface water during FY2009~2010

Tetrabromodiphenyl ethers	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2009	17	16	160	nd	8 [3]	44/49	44/49
	2010	nd	nd	390	nd	9 [3]	17/49	17/49

Pentabromodiphenyl ethers	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2009	11	12	87	nd	11 [4]	43/49	43/49
	2010	tr(1)	tr(1)	130	nd	3 [1]	25/49	25/49

Hexabromodiphenyl ethers	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2009	tr(0.9)	tr(0.7)	18	nd	1.4 [0.6]	26/49	26/49
	2010	nd	nd	51	nd	4 [2]	16/49	16/49

Heptabromodiphenyl ethers	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2009	nd	nd	40	nd	4 [2]	9/49	9/49
	2010	nd	nd	14	nd	3 [1]	17/49	17/49

Octabromodiphenyl ethers	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2009	3.0	3.9	56	nd	1.4 [0.6]	37/49	37/49
	2010	tr(2)	tr(2)	69	nd	3 [1]	40/49	40/49

Nonabromodiphenyl ethers	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2009	tr(46)	tr(38)	500	nd	91 [30]	32/49	32/49
	2010	tr(17)	tr(13)	620	nd	21 [7]	39/49	39/49

Decabromodiphenyl ether	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Surface Water (pg/L)	2009	tr(310)	tr(220)	3,400	nd	600 [200]	26/49	26/49
	2010	tr(250)	tr(200)	13,000	nd	300 [100]	31/49	31/49

<Sediment>

Tetrabromodiphenyl ethers: 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 2pg/g-dry, and none of the detected concentrations exceeded 910 pg/g-dry.

Pentabromodiphenyl ethers: The presence of the substance in sediment was monitored at 64 sites, and it was detected at 58 of the 64 valid sites adopting the detection limit of 2pg/g-dry, and none of the detected concentrations exceeded 740 pg/g-dry.

Hexabromodiphenyl ethers: 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 2pg/g-dry, and none of the detected concentrations exceeded 770 pg/g-dry.

Heptabromodiphenyl ethers: The presence of the substance in sediment was monitored at 64 sites, and it was detected at 58 of the 64 valid sites adopting the detection limit of 2pg/g-dry, and none of the detected concentrations exceeded 930 pg/g-dry.

Octabromodiphenyl ethers: The presence of the substance in sediment was monitored at 64 sites, and it was detected at 60 of the 64 valid sites adopting the detection limit of 4pg/g-dry, and none of the detected concentrations exceeded 1,800 pg/g-dry.

Nonabromodiphenyl ethers: The presence of the substance in sediment was monitored at 64 sites, and it was detected at 60 of the 64 valid sites adopting the detection limit of 9pg/g-dry, and none of the detected concentrations exceeded 26,000 pg/g-dry.

Decabromodiphenyl ether: The presence of the substance in sediment was monitored at 64 sites, and it was detected at 60 of the 64 valid sites adopting the detection limit of 80pg/g-dry, and none of the detected concentrations exceeded 700,000 pg/g-dry.

Stocktaking of the detection of Polybromodiphenyl ethers (Br4～Br10) in sediment during FY2009~2010

Tetrabromodiphenyl ethers:	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Sediment	2009	tr(60)	tr(44)	1,400	nd	69 [23]	131/192	51/64
(pg/g-dry)	2010	35	38	910	nd	6 [2]	57/64	57/64
Pentabromodiphenyl ethers	**Monitored year**	**Geometric mean***	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**Detection Frequency Sample**	**Detection Frequency Site**
Sediment	2009	36	24	1,700	nd	24 [8]	146/192	57/64
(pg/g-dry)	2010	26	23	740	nd	5 [2]	58/64	58/64
Hexabromodiphenyl ethers	**Monitored year**	**Geometric mean***	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**Detection Frequency Sample**	**Detection Frequency Site**
Sediment	2009	21	21	2,600	nd	5 [2]	139/192	53/64
(pg/g-dry)	2010	23	23	770	nd	4 [2]	57/64	57/64
Heptabromodiphenyl ethers	**Monitored year**	**Geometric mean***	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**Detection Frequency Sample**	**Detection Frequency Site**
Sediment	2009	30	25	16,000	nd	9 [4]	125/192	51/64
(pg/g-dry)	2010	28	18	930	nd	4 [2]	58/64	58/64
Octabromodiphenyl ethers	**Monitored year**	**Geometric mean***	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**Detection Frequency Sample**	**Detection Frequency Site**
Sediment	2009	210	96	110,000	nd	1.2 [0.5]	182/192	63/64
(pg/g-dry)	2010	71	76	1,800	nd	10 [4]	60/64	60/64
Nonabromodiphenyl ethers	**Monitored year**	**Geometric mean***	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**Detection Frequency Sample**	**Detection Frequency Site**
Sediment	2009	1,100	710	230,000	nd	9 [4]	181/192	64/64
(pg/g-dry)	2010	360	430	26,000	nd	24 [9]	60/64	60/64
Decabromodiphenyl ether	**Monitored year**	**Geometric mean***	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**Detection Frequency Sample**	**Detection Frequency Site**
Sediment	2009	6,000	4,800	880,000	tr(30)	60 [20]	192/192	64/64
(pg/g-dry)	2010	5,100	4,200	700,000	nd	220 [80]	60/64	60/64

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2009.

<Wildlife>

Tetrabromodiphenyl ethers: The presence of the substance in bivalves was monitored in 6 areas, and it was detected at 5 of the 6 valid areas adopting the detection limit of 16pg/g-wet, and none of the detected concentrations exceeded 310 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 16pg/g-wet, and the detection range was tr(16)～740 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 16pg/g-wet, and the detection range was 72～270 pg/g-wet.

Pentabromodiphenyl ethers: The presence of the substance in bivalves was monitored in 6 areas, and it was detected at 6 of the valid areas adopting the detection limit of 6pg/g-wet, and the detection range was tr(9)～98 pg/g-wet.For fish, the presence of the substance was monitored in 18 areas, and it was detected at 16 of the 18 valid areas adopting the detection limit of 6pg/g-wet, and none of the detected concentrations exceeded 200 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 6pg/g-wet, and the detection range was 120～200 pg/g-wet.

Hexabromodiphenyl ethers: The presence of the substance in bivalves was monitored in 6 areas, and it was detected at 4 of the 6 valid areas adopting the detection limit of 3pg/g-wet, and none of the detected concentrations exceeded 26 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at 16 of the 18 valid areas adopting the detection limit of 3pg/g-wet, and none of the detected concentrations exceeded 400 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 3pg/g-wet, and the detection range was 86～140 pg/g-wet.

Heptabromodiphenyl ethers: The presence of the substance in bivalves was monitored in 6 areas, and it was detected at 1 of the 6 valid areas adopting the detection limit of 10pg/g-wet, and none of the detected concentrations exceeded tr(10) pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at 4 of the 18 valid areas adopting the detection limit of 10pg/g-wet, and none of the detected concentrations exceeded 40 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at 1 of the 2 valid areas adopting the detection limit of 10pg/g-wet, and none of the detected concentrations exceeded 70 pg/g-wet.

Octabromodiphenyl ethers: The presence of the substance in bivalves was monitored in 6 areas, and it was detected at 2 of the 6 valid areas adopting the detection limit of 4pg/g-wet, and none of the detected concentrations exceeded tr(10) pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at 8 of the 18 valid areas adopting the detection limit of 4pg/g-wet, and none of the detected concentrations exceeded 100 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 4pg/g-wet, and the detection range was 26～65 pg/g-wet.

Nonabromodiphenyl ethers: The presence of the substance in bivalves was monitored in 6 areas, and it was detected at 5 of the 6 valid areas adopting the detection limit of 10pg/g-wet, and none of the detected concentrations exceeded 60 pg/g-wet.For fish, the presence of the substance was monitored in 18 areas, and it was detected at 3 of the 18 valid areas adopting the detection limit of 10pg/g-wet, and none of the detected concentrations exceeded 40 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 10pg/g-wet, and the detection range was tr(20)～50 pg/g-wet.

Decabromodiphenyl ether: The presence of the substance in bivalves was monitored in 6 areas, and it was detected at 2 of the 6 valid areas adopting the detection limit of 97pg/g-wet, and none of the detected concentrations exceeded tr(190) pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at 2 of the 18 valid areas adopting the detection limit of 97pg/g-wet, and none of the detected concentrations exceeded tr(150) pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was not detected at all 18 valid areas adopting the detection limit of 97pg/g-wet.

Stocktaking of the detection of Polybromodiphenyl ethers (Br4～Br10) in wildlife during FY2009~2010

Tetrabromodiphenyl ethers	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Bivalves (pg/g-wet)	2008	73	61	380	20	5.9 [2.2]	31/31	7/7
	2010	59	73	310	nd	43 [16]	5/6	5/6
Fish (pg/g-wet)	2008	120	110	1,300	9.8	5.9 [2.2]	85/85	17/17
	2010	160	170	740	tr(16)	43 [16]	18/18	18/18
Birds (pg/g-wet)	2008	170	190	1,200	32	5.9 [2.2]	10/10	2/2
	2010	140	---	270	72	43 [16]	2/2	2/2

Pentabromodiphenyl ethers	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Bivalves (pg/g-wet)	2008	32	27	94	tr(11)	16 [5.9]	31/31	7/7
	2010	32	37	98	tr(9)	14 [6]	6/6	6/6
Fish (pg/g-wet)	2008	30	37	280	nd	16 [5.9]	72/85	16/17
	2010	51	54	200	nd	14 [6]	16/18	16/18
Birds (pg/g-wet)	2008	150	130	440	52	16 [5.9]	10/10	2/2
	2010	150	---	200	120	14 [6]	2/2	2/2

Hexabromodiphenyl ethers	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Bivalves (pg/g-wet)	2008	19	16	82	tr(5.3)	14 [5.0]	31/31	7/7
	2010	8	16	26	nd	8 [3]	4/6	4/6
Fish (pg/g-wet)	2008	46	51	310	nd	14 [5.0]	83/85	17/17
	2010	39	47	400	nd	8 [3]	16/18	16/18
Birds (pg/g-wet)	2008	140	120	380	62	14 [5.0]	10/10	2/2
	2010	110	---	140	86	8 [3]	2/2	2/2

Heptabromodiphenyl ethers	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Bivalves (pg/g-wet)	2008	tr(8.5)	tr(7.6)	35	nd	18 [6.7]	20/31	7/7
	2010	nd	nd	tr(10)	nd	30 [10]	1/6	1/6
Fish (pg/g-wet)	2008	tr(11)	tr(8.1)	77	nd	18 [6.7]	44/85	10/17
	2010	nd	nd	40	nd	30 [10]	4/18	4/18
Birds (pg/g-wet)	2008	35	35	53	19	18 [6.7]	10/10	2/2
	2010	tr(19)	---	70	nd	30 [10]	1/2	1/2

Octabromodiphenyl ethers	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Bivalves (pg/g-wet)	2008	nd	nd	10	nd	9.6 [3.6]	15/31	6/7
	2010	nd	nd	tr(10)	nd	11 [4]	2/6	2/6
Fish (pg/g-wet)	2008	tr(5.7)	nd	73	nd	9.6 [3.6]	35/85	7/17
	2010	tr(6)	nd	100	nd	11 [4]	8/18	8/18
Birds (pg/g-wet)	2008	42	41	64	30	9.6 [3.6]	10/10	2/2
	2010	41	---	65	26	11 [4]	2/2	2/2

Nonabromodiphenyl ethers	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Bivalves (pg/g-wet)	2008	nd	nd	tr(23)	nd	35 [13]	5/31	1/7
	2010	tr(16)	tr(15)	60	nd	30 [10]	5/6	5/6
Fish (pg/g-wet)	2008	nd	nd	tr(15)	nd	35 [13]	2/85	2/17
	2010	nd	nd	40	nd	30 [10]	3/18	3/18
Birds (pg/g-wet)	2008	tr(21)	tr(20)	tr(33)	nd	35 [13]	9/10	2/2
	2010	32	---	50	tr(20)	30 [10]	2/2	2/2

Decabromodiphenyl ether	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Bivalves (pg/g-wet)	2008	nd	nd	tr(170)	nd	220 [74]	8/31	3/7
	2010	nd	nd	tr(190)	nd	270 [97]	2/6	2/6
Fish (pg/g-wet)	2008	nd	nd	230	nd	220 [74]	5/76	4/16
	2010	nd	nd	tr(150)	nd	270 [97]	2/18	2/18
Birds (pg/g-wet)	2008	nd	nd	tr(110)	nd	220 [74]	4/10	1/2
	2010	nd	---	nd	nd	270 [97]	0/2	0/2

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2008.

<Air>

Tetrabromodiphenyl ethers: 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 0.05pg/m^3, and the detection range was 0.15～50 pg/m^3.

For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.05pg/m^3, and the detection range was tr(0.09)～25 pg/m^3.

Pentabromodiphenyl ethers: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at 35 of the 37 valid sites adopting the detection limit of 0.05pg/m^3, and none of the detected concentrations exceeded 45 pg/gm^3.For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at 34 of the 37 valid sites adopting the detection limit of 0.05pg/m^3, and none of the detected concentrations exceeded 28 pg/gm^3.

Hexabromodiphenyl ethers: 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 0.06pg/m^3, and none of the detected concentrations exceeded 4.9 pg/gm^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at 31 of the 37 valid sites adopting the detection limit of 0.06pg/m^3, and none of the detected concentrations exceeded 5.4 pg/gm^3.

Heptabromodiphenyl ethers: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at 24 of the 37 valid sites adopting the detection limit of 0.1pg/m^3, and none of the detected concentrations exceeded 1.4 pg/gm^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at 28 of the 37 valid sites adopting the detection limit of 0.1pg/m^3, and none of the detected concentrations exceeded 11 pg/gm^3.

Octabromodiphenyl ethers: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at 30 of the 37 valid sites adopting the detection limit of 0.06pg/m^3, and none of the detected concentrations exceeded 2.3 pg/gm^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at 32 of the 37 valid sites adopting the detection limit of 0.06pg/m^3, and none of the detected concentrations exceeded 6.9 pg/gm^3.

Nonabromodiphenyl ethers: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at 12 of the 37 valid sites adopting the detection limit of 1.2pg/m^3, and none of the detected concentrations exceeded 24 pg/gm^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at 22 of the 37 valid sites adopting the detection limit of 1.2pg/m^3, and none of the detected concentrations exceeded 7.1 pg/gm^3.

Decabromodiphenyl ether: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at 10 of the 37 valid sites adopting the detection limit of 9.1pg/m^3, and none of the detected concentrations exceeded 290 pg/gm^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at 21 of the 37 valid sites adopting the detection limit of 9.1pg/m^3, and none of the detected concentrations exceeded 88 pg/gm^3.

Stocktaking of the detection of Polybromodiphenyl ethers (Br4～Br10) in air during FY2009~2010

Tetrabromo diphenyl ethers:	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Air (pg/m^3)	2009 Warm season	0.89	0.80	18	0.11	0.11 [0.04]	37/37	37/37
	2009 Cold season	0.40	0.37	7.1	tr(0.04)		37/37	37/37
	2010 Warm season	0.79	0.57	50	0.15	0.12 [0.05]	37/37	37/37
	2010 Cold season	0.40	0.35	25	tr(0.09)		37/37	37/37
Pentabromo diphenyl ethers	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Sample	Site
Air (pg/m^3)	2009 Warm season	0.20	0.19	18	nd	0.16 [0.06]	33/37	33/37
	2009 Cold season	0.19	0.16	10	nd		29/37	29/37
	2010 Warm season	0.20	0.17	45	nd	0.12 [0.05]	35/37	35/37
	2010 Cold season	0.20	0.22	28	nd		34/37	34/37
Hexabromo diphenyl ethers	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Sample	Site
Air (pg/m^3)	2009 Warm season	tr(0.11)	tr(0.11)	2.0	nd	0.22 [0.09]	19/37	19/37
	2009 Cold season	tr(0.20)	0.22	27	nd		24/37	24/37
	2010 Warm season	tr(0.14)	tr(0.13)	4.9	nd	0.16 [0.06]	29/37	29/37
	2010 Cold season	0.24	0.27	5.4	nd		31/37	31/37
Heptabromo diphenyl ethers	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Sample	Site
Air (pg/m^3)	2009 Warm season	tr(0.1)	nd	1.7	nd	0.3 [0.1]	17/37	17/37
	2009 Cold season	tr(0.2)	0.3	20	nd		25/37	25/37
	2010 Warm season	tr(0.2)	tr(0.1)	1.4	nd	0.3 [0.1]	24/37	24/37
	2010 Cold season	0.3	0.4	11	nd		28/37	28/37
Octabromo diphenyl ethers	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Sample	Site
Air (pg/m^3)	2009 Warm season	tr(0.2)	0.3	1.6	nd	0.3 [0.1]	23/37	23/37
	2009 Cold season	0.3	0.4	7.1	nd		26/37	26/37
	2010 Warm season	0.25	0.30	2.3	nd	0.15 [0.06]	30/37	30/37
	2010 Cold season	0.40	0.52	6.9	nd		32/37	32/37
Nonabromo diphenyl ethers	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Sample	Site
Air (pg/m^3)	2009 Warm season	tr(0.7)	tr(0.7)	3.0	nd	1.8 [0.6]	22/37	22/37
	2009 Cold season	tr(1.0)	tr(0.8)	3.9	nd		27/37	27/37
	2010 Warm season	nd	nd	24	nd	3.7 [1.2]	12/37	12/37
	2010 Cold season	tr(1.2)	tr(1.3)	7.1	nd		22/37	22/37
Decabromo diphenyl ether	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Sample	Site
Air (pg/m^3)	2009 Warm season	tr(7)	tr(9)	31	nd	16 [5]	28/37	28/37
	2009 Cold season	tr(10)	tr(11)	45	nd		29/37	29/37
	2010 Warm season	nd	nd	290	nd	27 [9.1]	10/37	10/37
	2010 Cold season	tr(11)	tr(12)	88	nd		21/37	21/37

[15] Perfluorooctane sulfonic acid (PFOS)

・ History and state of monitoring

Perfluorooctane sulfonic acids (PFOS) have been used as water repellent agent, oil repellent agent and surface acting agent. Perfluorooctane sulfonic acids (PFOS) were adopted as target chemicals at the COP4 of the Stockholm convention on Persistent Organic Pollutants in May 2009.

Under the framework of the Environmental Monitoring, the substance was monitored in surface water, sediment and wildlife (bivalves, fish and birds) in FY 2009.

The survey of the Perfluorooctane sulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) only monitored linear octyl Perfluorooctane sulfonic acid (PFOS) and linear octyl Perfluorooctanoic acid (PFOA).

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 49 sites, and it was detected at all 49 valid sites adopting the detection limit of 20pg/L, and the detection range was tr(37)～230,000 pg/L.

Stocktaking of the detection of Perfluorooctane sulfonic acid (PFOS) in surface water during FY2009~2010

Perfluorooctane sulfonic acid (PFOS)	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Surface Water (pg/L)	2009	730	580	14,000	tr(26)	37 [14]	49/49	49/49
	2010	490	380	230,000	tr(37)	50 [20]	49/49	49/49

<Sediment>

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 2pg/g-dry, and the detection range was tr(3)～1,700 pg/g-dry.

Stocktaking of the detection of Perfluorooctane sulfonic acid (PFOS) in sediment during FY2009~2010

Perfluorooctane sulfonic acid (PFOS)	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Sediment (pg/g-dry)	2009	78	97	1,900	nd	9.6 [3.7]	180/190	64/64
	2010	82	100	1,700	tr(3)	5 [2]	64/64	64/64

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2009.

<Wildlife>

The presence of the substance in bivalves was monitored in 6 areas, and it was detected at 5 of the 6 valid areas adopting the detection limit of 9.6pg/g-wet, and none of the detected concentrations exceeded 680 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at 17 of the 18 valid areas adopting the detection limit of 9.6pg/g-wet, and none of the detected concentrations exceeded 15,000 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 9.6pg/g-wet, and the detection range was 580～3,000 pg/g-wet.

Stocktaking of the detection of Perfluorooctane sulfonic acid (PFOS) in wildlife during FY2009~2010

Perfluorooctane sulfonic acid (PFOS)	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Bivalves (pg/g-wet)	2009	24	28	640	nd	19 [7.4]	17/31	5/7
	2010	72	85	680	nd	25 [9.6]	5/6	5/6
Fish (pg/g-wet)	2009	220	230	15,000	nd	19 [7.4]	83/90	17/18
	2010	390	480	15,000	nd	25 [9.6]	17/18	17/18
Birds (pg/g-wet)	2009	300	360	890	37	19 [7.4]	10/10	2/2
	2010	1,300	---	3,000	580	25 [9.6]	2/2	2/2

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2009.

<Air>

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 0.1pg/m^3, and the detection range was 1.6～14 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.1pg/m^3, and the detection range was 1.4～15 pg/m^3.

Stocktaking of the detection of Perfluorooctane sulfonic acid (PFOS) in wildlife in FY2010

Perfluorooctane sulfonic acid (PFOS)	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Air (pg/m^3)	2010 Warm season	5.2	5.9	14	1.6	0.4 [0.1]	37/37	37/37
	2010 Cold season	4.7	4.4	15	1.4		37/37	37/37

[16] Perfluorooctanoic acid (PFOA)

・ History and state of monitoring

Perfluorooctanoic acids (PFOA) have been used as water repellent agent, oil repellent agent and surface acting agent. Perfluorooctanoic acids (PFOA) were adopted as target chemicals at the COP4 of the Stockholm convention on Persistent Organic Pollutants in May 2009.

The substances were measured in surface water, sediment and wildlife in FY 2002, 2003, 2004, 2005 under the framework of "the Environmental Survey and Monitoring of Chemicals".

The survey of the Perfluorooctane sulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) only monitored linear octyl Perfluorooctane sulfonic acid (PFOS) and linear octyl Perfluorooctanoic acid (PFOA). However, it remains possible that the survey in wildlife monitored branched-chain Perfluorooctane sulfonic acid (PFOS) and branched-chain Perfluorooctanoic acid (PFOA).

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 49 sites, and it was detected at all 49 valid sites adopting the detection limit of 20pg/L, and the detection range was 190～23,000 pg/L.

Stocktaking of the detection of Perfluorooctanoic acid (PFOA) in surface water during FY2009~2010

Perfluorooctanoic acid(PFOA)	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Surface Water	2009	1,600	1,300	31,000	250	59 [23]	49/49	49/49
(pg/L)	2010	2,700	2,400	23,000	190	60 [20]	49/49	49/49

<Sediment>

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 62 of the 64 valid sites adopting the detection limit of 5pg/g-dry, and none of the detected concentrations exceeded 180 pg/g-dry.

Stocktaking of the detection of Perfluorooctanoic acid (PFOA) in sediment during FY2009~2010

Perfluorooctanoic acid(PFOA)	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Sediment	2009	27	24	500	nd	8.3 [3.3]	182/190	64/64
(pg/g-dry)	2010	28	33	180	nd	12 [5]	62/64	62/64

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2009.

<Wildlife>

The presence of the substance in bivalves was monitored in 6 areas, and it was detected at 5 of the 6 valid areas adopting the detection limit of 9.9pg/g-wet, and none of the detected concentrations exceeded 76 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at 13 of the 18 valid areas adopting the detection limit of 9.9pg/g-wet, and none of the detected concentrations exceeded 95 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 9.9pg/g-wet, and the detection range was 30～48 pg/g-wet.

Stocktaking of the detection of Perfluorooctanoic acid (PFOA) in wildlife (bivalves, fish and birds) during FY2009~2010

Perfluorooctanoic acid(PFOA)	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Bivalves (pg/g-wet)	2009	tr(20)	tr(21)	94	nd	25 [9.9]	27/31	7/7
	2010	28	33	76	nd	26 [9.9]	5/6	5/6
Fish (pg/g-wet)	2009	tr(23)	tr(19)	490	nd	25 [9.9]	74/90	17/18
	2010	tr(13)	tr(11)	95	nd	26 [9.9]	13/18	13/18
Birds (pg/g-wet)	2009	32	29	58	tr(16)	25 [9.9]	10/10	2/2
	2010	38	---	48	30	26 [9.9]	2/2	2/2

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2009.

<Air>

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 0.2pg/m^3, and the detection range was 4.0～210 pg/m^3.For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.2pg/m^3, and the detection range was 2.4～130 pg/m^3.

Stocktaking of the detection of Perfluorooctanoic acid (PFOA) in air during FY2009~2010

Perfluorooctanoic acid (PFOA)	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Air (pg/m^3)	2010 Warm season	25	26	210	4.0	0.5 [0.2]	37/37	37/37
	2010 Cold season	14	14	130	2.4		37/37	37/37

[17] Pentachlorobenzene

・ History and state of monitoring

Pentachlorobenzene have been used as flame retardants and pesticide. It was historically never registered under the Agricultural Chemicals Regulation Law. The pentachlorobenzene is produced as a by-product when agricultural chemicals are produced. In addition, it is generated unintentionally at the time of combustion. Pentachlorobenzene was adopted as target chemicals at the COP4 of the Stockholm convention on Persistent Organic Pollutants in May 2009 and designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in April 2010.

Under the framework of the Environmental Monitoring, the substance was monitored in surface water, sediment, wildlife (bivalves, fish and birds) and air in FY 2007, and air in FY 2009.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 49 sites, and it was detected at all 49 valid sites adopting the detection limit of 1pg/L, and the detection range was tr(1)～100 pg/L.

Stocktaking of the detection of Pentachlorobenzene in air in FY2007 and FY2010

Penta chloro benzene	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Surface Water (pg/L)	2007	nd	nd	nd	nd	3,300 [1,300]	0/48	0/48
	2010	8	5	100	tr(1)	4 [1]	49/49	49/49

<Sediment>

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 0.3pg/g-dry, and the detection range was 1.0～4,200 pg/g-dry.

Stocktaking of the detection of Pentachlorobenzene in air in FY2007 and FY2010

Penta chloro benzene	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Sediment (pg/g-dry)	2007	tr(46)	nd	2,400	nd	86 [33]	79/19	35/64
	2010	90	95	4,200	1.0	0.9 [0.3]	64/64	64/64

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2007.

<Wildlife>

The presence of the substance in bivalves was monitored in 6 areas, and it was detected at 6 of the 6 valid areas adopting the detection limit of 0.7pg/g-wet, and the detection range was 5.9～110 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 0.7pg/g-wet, and the detection range was 5.6～230 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at all 2 valid areas adopting the detection limit of 0.7pg/g-wet, and the detection range was 49～170 pg/g-wet.

Stocktaking of the detection of Pentachlorobenzene in air in FY2007 and FY2010

Penta chloro benzene	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Bivalves (pg/g-wet)	2007	nd	nd	tr(150)	nd	180 [61]	1/31	1/7
	2010	18	16	110	5.9	1.9 [0.7]	6/6	6/6
Fish (pg/g-wet)	2007	nd	nd	480	nd	180 [61]	36/80	10/16
	2010	42	37	230	5.6	1.9 [0.7]	18/18	18/18
Birds (pg/g-wet)	2007	tr(140)	tr(140)	210	tr(89)	180 [61]	10/10	2/2
	2010	91	---	170	49	1.9 [0.7]	2/2	2/2

(Note) “ * ” :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived in FY2007.

<Air>

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 0.5pg/m^3, and the detection range was 36～140 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.5pg/m^3, and the detection range was 37～180 pg/m^3.

Stocktaking of the detection of Pentachlorobenzene in air in FY2007 , FY2009 and FY2010

Penta chloro benzene	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Detection Frequency Site
Air (pg/m^3)	2008 Warm season	85	83	310	18	12 [4.8]	78/78	26/26
	2008 Cold season	60	55	220	27		75/75	25/25
	2009 Warm season	63	64	210	20	6.4 [2.5]	111/111	37/37
	2009 Cold season	25	22	120	tr(5.0)		111/111	37/37
	2010 Warm season	68	73	140	36	1.2 [0.5]	37/37	37/37
	2010 Cold season	70	69	180	37		37/37	37/37

[18] ***N,N*-Diphenyl-*p*-phenylenediamine**

・ History and state of monitoring

N,N-Diphenyl-*p*-phenylenediamine has been used as rubber antioxidant and raw materials of styrene-butadiene rubber. *N,N*-Ditolyl-*p*-phenylenediamine, *N,N*-Dixylyl-*p*-phenylenediamine, and *N,N*-Tolyl-*p*-phenylenediamine were designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in September 2002. Although *N,N*-Ditolyl-*p*-phenylenediamine and *N,N*-Dixylyl-*p*-phenylenediamine have not been manufactured, imported and used in Japan, it is stated that it is important to survey the existing condition in the environment due to its high enrichment.

Under the framework of the Environmental Monitoring, the substance was monitored in surface water in FY 2008.

・ Monitoring results

○ *N,N*-Diphenyl-*p*-phenylenediamine, *N,N*-Ditolyl-*p*-phenylenediamine, and *N,N*-Dixylyl-*p*-phenylenediamine

<Air >

N,N-Diphenyl-*p*-phenylenediamine: 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 0.34pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was not detected at all 37 valid sites adopting the detection limit of 0.34pg/m^3.

N,N-Ditolyl-*p*-phenylenediamine: 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 0.51pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was not detected at all 37 valid sites adopting the detection limit of 0.51pg/m^3.

N,N-Dixylyl-*p*-phenylenediamine: 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 0.34pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites, and it was not detected at all 37 valid sites adopting the detection limit of 0.34pg/m^3.

Stocktaking of the detection of *N,N*-Diphenyl-*p*-phenylenediamine in air in FY2010.

N,N-Diphenyl-*p*-phenylenediamine	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Air (pg/m^3)	2010	nd	nd	nd	nd	1.4 [0.34]	0/114	0/37

N,N-Diphenyl-*p*-phenylenediamine	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Air (pg/m^3)	2010	nd	nd	nd	nd	1.5 [0.51]	0/114	0/37

N,N-Diphenyl-*p*-phenylenediamine	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency Sample	Site
Air (pg/m^3)	2010	nd	nd	nd	nd	1.4 [0.34]	0/114	0/37

[19] Tributyltin compounds

・ History and state of monitoring

Tributyltin compounds have been applied as antifouling barrier coating for ship bottoms and on fishing nets. However as of FY 1988, 13 Tributyltin compounds became designated chemical substances under the Law Concerning the Examination and Regulation of Manufacture of Chemical Substances (today's Class II Specified Chemical Substances).

In the monitoring surveys since FY 2002, sediment and wildlife surveys were implemented in FYs 2002 and 2003. Surface water, sediment and wildlife surveys were conducted in FY 2005.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 49 sites, and it was detected at 12 of the 49 valid sites adopting the detection limit of 100pg/L, and none of the detected concentrations exceeded 1,600 pg/L.

Stocktaking of the detection of Tributyltin compounds in surface water during FY2005 and FY2010

Tributyltin compounds	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Surface Water (pg/L)	2005	nd	nd	760	nd	300 [100]	2/47	2/47
	2010	nd	nd	1,600	nd	200 [100]	12/49	12/49

<Sediment>

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 53 of the 64 valid sites adopting the detection limit of 80pg/g-dry, and none of the detected concentrations exceeded 1,300,000 pg/g-dry.

Stocktaking of the detection of Tributyltin compounds in sediment during FY2002~2003, FY2005 and FY2010

Tributyltin compounds	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	5,200	4,000	390,000	nd	3,600 [1,200]	126/189	48/63
	2003	3,300	4,400	450,000	nd	1,200 [400]	127/186	46/62
	2005	2,300	4,500	590,000	nd	200 [80]	143/189	52/63
	2010	2,500	3,400	1,300,000	nd	160 [80]	148/192	53/64

<Wildlife>

The presence of the substance in bivalves was monitored in 6 areas, and it was detected at 6 of the 6 valid areas adopting the detection limit of 160pg/g-wet, and the detection range was 1,600～30,000 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at 17 of the 18 valid areas adopting the detection limit of 160pg/g-wet, and none of the detected concentrations exceeded 23,000 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was not detected at all 18 valid areas adopting the detection limit of 160pg/g-wet.

Stocktaking of the detection of Tributyltin compounds in wildlife during FY2002~2003, FY2005 and FY2010

Tributyltin compounds	Monitored year	Geometric mean*	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	12,000	12,000	57,000	tr(2,000)	3,000 [1,000]	38/38	8/8
	2003	10,000	12,000	25,000	tr(2,000)	3,000 [1,000]	30/30	6/6
	2005	6,400	7,00	25,000	tr(1,500)	3,000 [1,000]	31/31	7/7
	2010	6,400	6,000	30,000	1,600	420 [160]	16/16	6/6
Fish (pg/g-wet)	2002	8,000	6,000	500,000	nd	3,000 [1,000]	55/70	13/14
	2003	8,000	6,000	72,000	nd	3,000 [1,000]	63/70	13/14
	2005	3,300	4,200	130,000	nd	3,000 [1,000]	49/80	11/16
	2010	1,100	760	23,000	nd	420 [160]	49/54	17/18
Birds (pg/g-wet)	2002	nd	nd	nd	nd	3,000 [1,000]	0/10	0/2
	2003	nd	nd	tr(1,000)	nd	3,000 [1,000]	1/10	1/2
	2005	nd	nd	nd	nd	3,000 [1,000]	0/10	0/2
	2010	nd	nd	nd	nd	420 [160]	0/6	0/2

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived.

[20] Triphenyltin compounds

・ History and state of monitoring

Like Tributyltin compounds, Triphenyltin compounds have also been applied as antifouling coats to ship bottoms and fishing nets. In FY 1988, seven triphenyltin compounds became designated chemical substances under Law the Concerning the Examination and Regulation of Manufacture of Chemical Substances (today's Class II Specified Chemical Substances).

In the monitoring surveys since FY 2002, sediment and wildlife surveys were conducted in FYs 2002 and 2003. Surface water, sediment and wildlife surveys were conducted in FY 2005.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 49 sites, and it was detected at 4 of the 49 valid sites adopting the detection limit of 50pg/L, and none of the detected concentrations exceeded 250 pg/L.

Stocktaking of the detection of Triphenyltin compounds in surface water during FY2005 and FY2010

Triphenyltin compounds	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Surface Water (pg/L)	2005	nd	nd	190	nd	130 [50]	2/47	2/47
	2010	nd	nd	250	nd	120 [50]	4/49	4/49

<Sediment>

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 42 of the 64 valid sites adopting the detection limit of 30pg/g-dry, and none of the detected concentrations exceeded 210,000 pg/g-dry.

Stocktaking of the detection of Triphenyltin compounds in sediment during FY2002~2003, FY2005 and FY2010

Triphenyltin compounds	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	tr(720)	nd	490	nd	1,600 [550]	76/189	30/63
	2003	300	tr(160)	540	nd	280 [90]	96/186	37/62
	2005	210	120	420	nd	70 [30]	104/189	39/63
	2010	290	190	210,000	nd	70 [30]	106/192	42/64

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived.

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was detected at 6 of the 7 valid areas adopting the detection limit of 110pg/g-wet, and the detection range was 490～6,500 pg/g-wet. For fish, the presence of the substance was monitored in 18 areas, and it was detected at all 18 valid areas adopting the detection limit of 110pg/g-wet, and the detection range was tr(140)～14,000 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas, and it was detected at 1 of the 2 valid areas adopting the detection limit of 110pg/g-wet, and none of the detected concentrations exceeded tr(120) pg/g-wet.

Stocktaking of the detection of Triphenyltin compounds in wildlife during FY2002~2003, FY2005 and FY2010

Triphenyltin compounds	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection Frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	2,300	4,500	25,000	nd	1,500 [500]	31/38	7/8
	2003	3,000	3,600	27,000	nd	1,500 [500]	26/30	6/6
	2005	2,900	2,900	15,000	tr(600)	1,500 [500]	31/31	7/7
	2010	1,700	1,500	6,500	490	270 [110]	16/16	6/6
Fish (pg/g-wet)	2002	8,500	7,900	520,000	nd	1,500 [500]	69/70	14/14
	2003	5,600	5,400	30,000	nd	1,500 [500]	68/70	14/14
	2005	4,200	4,900	34,000	nd	1,500 [500]	76/80	16/16
	2010	2,300	3,100	14,000	tr(140)	270 [110]	54/54	18/18
Birds (pg/g-wet)	2002	nd	nd	nd	nd	1,500 [500]	0/10	0/2
	2003	nd	nd	nd	nd	1,500 [500]	0/10	0/2
	2005	nd	nd	tr(500)	nd	1,500 [500]	1/10	1/2
	2010	nd	nd	tr(120)	nd	270 [110]	1/6	1/2

(Note) " * " :Arithmetic mean value was calculated for each point, from which the geometric mean value for all points was derived.