Chapter 3 Results of the Environmental Monitoring in FY 2008

1. Purpose of the monitoring

Environmental Monitoring is aimed at conducting an annual survey of the environmental persistence of target chemicals listed in the Stockholm Convention on Persistent Organic Pollutants (hereafter, the Stockholm Convention), and the possible candidate chemicals, and highly persistent chemicals among the Specified Chemical Substances and Monitored Chemical Substances under the Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances (Law No. 117 of 1973) (hereafter, the Chemical Substances Control Law), whose change in persistence in the environment must be understood.

*POPs: persistent organic pollutants

2. Target chemicals

In FY 2008 Environmental Monitoring, the usual 13 chemicals (groups) which added Hexachlorohexanes*, Chlordecone and Polybromodiphenyl ethers (Br_4～Br_{10})** which were adopted to be POPs in the Fourth Meeting of the Conference of the Parties of the Stockholm Convention (hereinafter, COP4) held from 4 to 8 May 2009, to the initial 10 chemicals (groups) included in the Stockholm Convention (except for Polychlorinated-p-dioxin and Polychlorinated dibenzofuran) (hereafter, POPs), and the 10 chemicals (groups), namely, 2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym: Atrazine), Dioctyltin compounds, *N*,*N'*-Diphenyl-p-phenylenediamines, 2,6-Di-tert-butyl-4-methylphenol (synonym: BHT), Dibenzothiophene, 2,2,2-Trichloro-1,1-bis (4-chlorophenyl) ethanol (synonym: Kelthane or Dicofol), 2,4,6-Tri-*tert*-butylphenol, Di-*n*-butyl phthalate, Polychlorinated naphthalenes and Tri-*n*-butyl phosphate, 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.

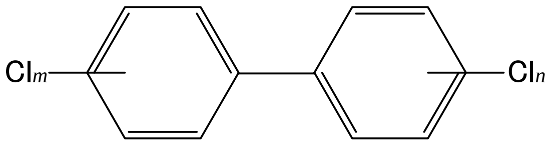
** In the COP4, Tetrabromodiphenyl ethers, Pentabromodiphenyl ethers, Hexabromodiphenyl ethers and Heptabromodiphenyl ethers were adopted to be POPs among Polybromodiphenyl ethers but in this Environmental Monitoring, Polybromodiphenyl ethers(Br_4～Br_{10}) which were able to include Octabromodiphenyl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

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	○	○	○	○
[4]	Dieldrin	○	○	○	○
[5]	Endrin	○	○	○	○
[6]	DDTs [6-1] *p,p'*-DDT [6-2] *p,p'*-DDE [6-3] *p,p'*-DDD [6-4] *o,p'*-DDT [6-5] *o,p'*-DDE [6-6] *o,p'*-DDD	○	○	○	○
[7]	Chlordanes [7-1] *cis*-Chlordane [7-2] *trans*-Chlordane [7-3] Oxychlordane [7-4] *cis*-Nonachlor [7-5] *trans*-Nonachlor	○	○	○	○
[8]	Heptachlors [8-1] Heptachlor [8-2] *cis*-Heptachlor epoxide [8-3] *trans*-Heptachlor epoxide	○	○	○	○
[9]	Toxaphenes [9-1] 2-endo,3-exo,5-endo,6-exo,8,8,10,10-octachlorobornane (Parlar-26) [9-2] 2-endo,3-exo,5-endo,6-exo,8,8,9,10,10-nonachlorobornane (Parlar-50) [9-3] 2,2,5,5,8,9,9,10,10-Nonachlorobornane (Parlar-62)	○	○	○	○
[10]	Mirex	○	○	○	○
[11]	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]	Polybromodiphenyl ethers(Br_4～Br_{10}) [13-1] Tetrabromodiphenyl ethers [13-2] Pentabromodiphenyl ethers [13-3] Hexabromodiphenyl ethers [13-4] Heptabromodiphenyl ethers [13-5] Octabromodiphenyl ethers [13-6] Nonabromodiphenyl ethers [13-7] Decabromodiphenyl ether			○	
[14]	2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine(synonym:Atrazine)	○	○		
[15]	Dioctyltin compounds	○	○	○	
[16]	*N*,*N'*-Diphenyl-*p*-phenylenediamines [16-1] *N*,*N'*-Diphenyl-*p*-phenylenediamine [16-2] *N*,*N'*-Ditolyl-*p*-phenylenediamine [16-3] *N*,*N'*-Ditolyl-*p*-phenylenediamine	○			
[17]	2,6-Di-*tert*-butyl-4-methylphenol (synonym:BHT)	○	○	○	○
[18]	Dibenzothiophene	○	○	○	
[19]	2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym:Kelthane or Dicofol)	○	○	○	
[20]	2,4,6-Tri-*tert*-butylphenol	○	○	○	○
[21]	Di-*n*-butyl phthalate	○	○	○	
[22]	Polychlorinated naphthalenes [22-1] Monoorinated naphthalenes [22-1-1] 2-Crinated naphthalene [22-2] Diorinated naphthalenes [22-2-1] 1,5-Diorinated naphthalene [22-2-2] 2,7-Diorinated naphthalene [22-3] Triorinated naphthalenes [22-3-1] 1,2,3-Triorinated naphthalene [22-4] Tetraorinated naphthalenes [22-4-1] 1,2,3,4-Tetraorinated naphthalene [22-4-2] 1,2,3,8-Tetraorinated naphthalene [22-4-3] 1,2,5,6-Tetraorinated naphthalene [22-4-4] 1,4,5,8-Tetraorinated naphthalene [22-4-5] 2,3,6,7-Tetraorinated naphthalene [22-5] Pentaorinated naphthalenes [22-5-1] 1,2,3,4,6-Pentaorinated naphthalene [22-5-2] 1,2,3,5,7-Pentaorinated naphthalene [22-5-3] 1,2,3,5,8-Pentaorinated naphthalene [22-6] Hexaorinated naphthalenes [22-6-1] 1,2,3,4,6,7-Hexaorinated naphthalene [22-6-2] 1,2,3,5,7,8-Hexaorinated naphthalene [22-6-3] 1,2,4,5,7,8-Hexaorinated naphthalene [22-7] Heptaorinated naphthalenes [22-7-1] 1,2,3,4,5,6,7-Heptaorinated naphthalene(#170) [22-8] Octaorinated naphthalene	○	○	○	○
[23]	Tri-*n*-butyl phosphate	○	○	○	

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

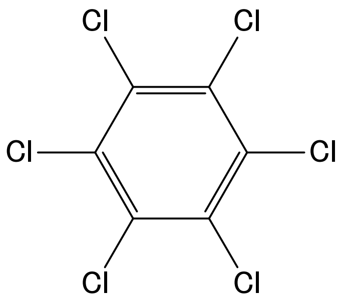
[1] Polychlorinated biphenyls (PCBs)



i = m+n =1～10

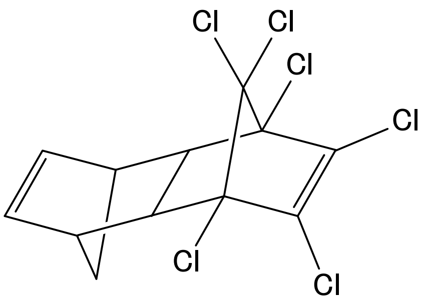
Molecular formula:	$C_{12}H_{(10-i)}Cl_i$(i = m+n =1～10)
CAS:	27323-18-8(Cl_1), 22512-42-9(Cl_2), 25323-68-6(Cl_3), 26914-33-0(Cl_4), 25429-29-2(Cl_5), 26601-64-9(Cl_6), 28655-71-2(Cl_7), 31472-83-0(Cl_8), 53742-07-7(Cl_9), 5051-24-3(Cl_{10})
ENCS:	No pertinence
MW:	188.65～498.66
mp:	Not specified
bp: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

[2] HCB (Hexachlorobenzene)



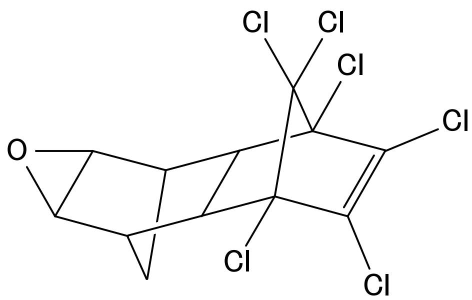
Molecular formula:	C_6Cl_6
CAS:	118-74-1
ENCS:	3-0076
MW:	284.78
mp:	231.8°C[1)]
bp:	323～326°C[1)]
SW:	0.0000096g/kg(25°C)[2)]
Specific gravity:	2.044(23°C)[1)]
logPow:	5.73[3)]

[3] Aldrin



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)]

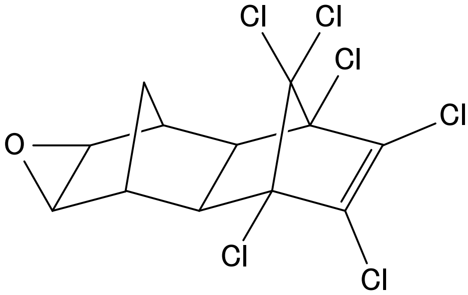
[4] Dieldrin



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).

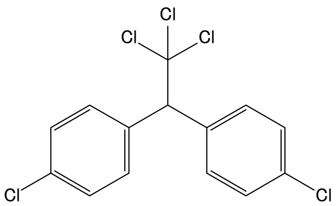
[5] Endrin



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]

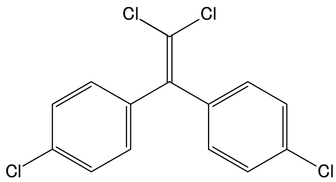
[6] DDTs

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



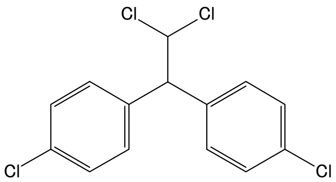
Molecular formula: $C_{14}H_9Cl_5$
CAS: 50-29-3
ENCS: 4-0910
MW: 354.49
mp: 108.5°C[2]
bp: 260°C[2]
SW: Insoluble[1]
Specific gravity: 1.6g/cm^3 [7]
logPow: 6.91[3]

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



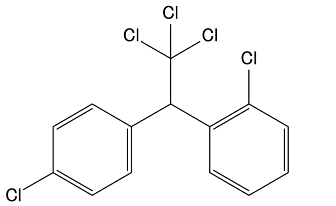
Molecular formula: $C_{14}H_8Cl_4$
CAS: 72-55-9
ENCS: No pertinence
MW: 318.03
mp: 89°C[2]
bp: 336°C[5]
SW: 0.12mg/L(25°C)[5]
Specific gravity: Uncertain
logPow: 6.51[3]

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



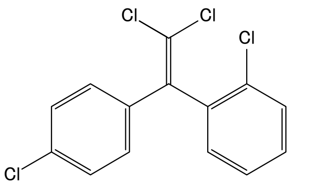
Molecular formula: $C_{14}H_{10}Cl_4$
CAS: 72-54-8
ENCS: No pertinence
MW: 320.04
mp: 109～110°C[1]
bp: 193°C(1mmHg)[2]
SW: 0.09mg/L(25°C)[5]
Specific gravity: Uncertain
logPow: 6.02[3]

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



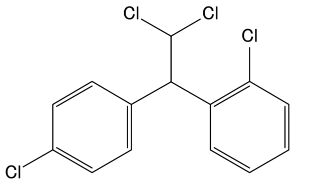
Molecular formula: $C_{14}H_9Cl_5$
CAS: 789-02-6
ENCS: No pertinence
MW: 354.49
mp: Uncertain
bp: Uncertain
SW: Uncertain
Specific gravity: Uncertain
logPow: Uncertain

[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

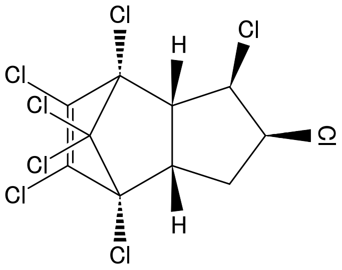
[6-6] *o,p'*-DDD



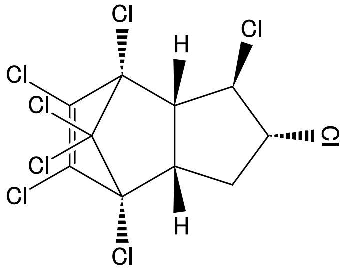
Molecular formula: $C_{14}H_{10}Cl_4$
CAS: 53-19-0
ENCS: No pertinence
MW: 320.04
mp: 76～78°C[1]
bp: Uncertain
SW: Uncertain
Specific gravity: Uncertain
logPow: Uncertain

[7] Chlordanes

[7-1] *cis*-Chlordane



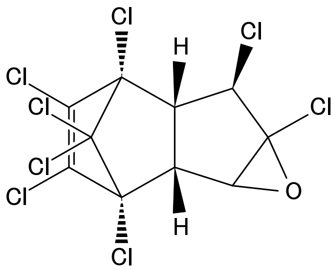
[7-2] *trans*-Chlordane



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

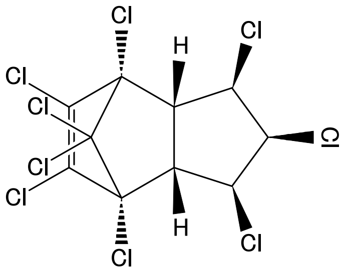
Molecular formula: $C_{10}H_6Cl_8$
CAS: 5103-71-9(*cis*), 5103-74-2(*trans*)
ENCS: 4-637
MW: 409.78
mp: 106°C[1)]
bp: 175°C(1mmHg)[1)]
SW: 0.0006g/kg(25°C)[1)]
Specific gravity: 1.59～1.63(25°C)[2)]
logPow: 6.16[3)]

[7-3] Oxychlordane



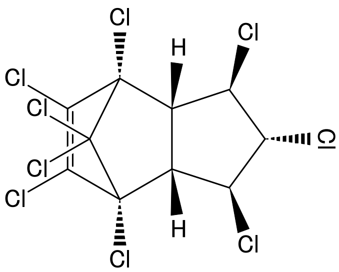
Molecular formula: $C_{10}H_4Cl_8O$
CAS: 26880-48-8
ENCS: No pertinence
MW: 423.76
mp: 100°C[1)]
bp: Uncertain
SW: Uncertain
Specific gravity: Uncertain
logPow: 4.76[3)]

[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)]

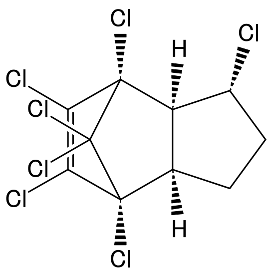
[7-5] *trans*-Nonachlor



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)]

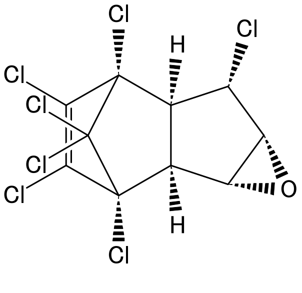
[8] Heptachlors

[8-1] Heptachlor

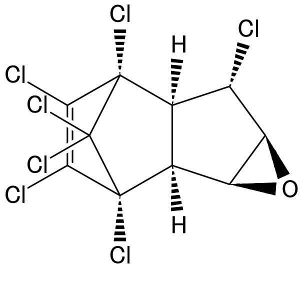


Molecular formula: $C_{10}H_5Cl_7$
CAS: 76-44-8
ENCS: 4-637、9-1646
MW: 373.32
mp: 95～96°C[2)]
bp: Uncertain
SW: 0.00018g/kg(25°C)[1)]
Specific gravity: 1.57(9°C)[1)]
logPow: 6.10[3)]

[8-2] *cis*-Heptachlor epoxide



[8-3] *trans*-Heptachlor epoxide

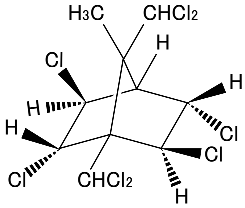


The following data are for both [8-2] and [8-3].

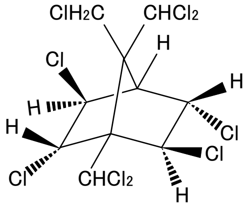
Molecular formula: $C_{10}H_5Cl_7O$
CAS: 1024-57-3
ENCS: No pertinence
MW: 389.32
mp: 160°C[1)]
bp: Uncertain
SW: Uncertain
Specific gravity: Uncertain
logPow: 5.40[3)]

[9] Toxaphenes

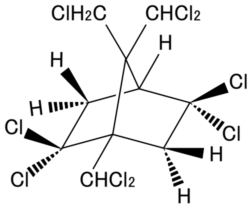
[9-1] 2-Endo,3-exo,5-endo,6-exo,8,8,10,10-octachlorobornane (Parlar-26)



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

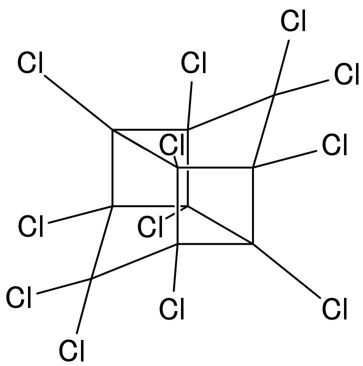


[9-3] 2,2,5,5,8,9,9,10,10-nonachlorobornane (Parlar-62)



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]

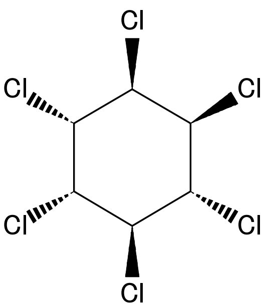
[10] Mirex



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]

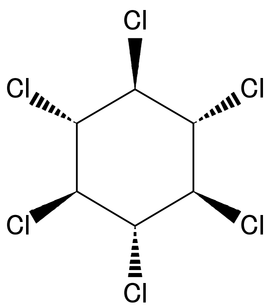
[11] HCHs(Hexachlorohexanes)

[11-1] *α*-HCH



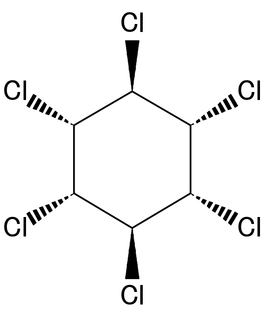
Molecular formula:	$C_6H_6Cl_6$
CAS:	319-84-6
ENCS:	3-2250、9-1652
MW:	290.83
mp:	158°C[1]
bp:	288°C[9]
SW:	0.00018g/kg(25°C)[2]
Specific gravity:	1.87(20°C)[10]
Molecular formula:	3.80[3]

[11-2] *β*-HCH



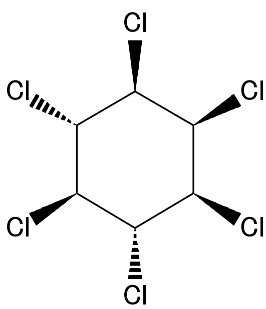
Molecular formula:	$C_6H_6Cl_6$
CAS:	319-85-7
ENCS:	3-2250、9-1652
MW:	290.83
mp:	309°C[11]
bp:	60°C(0.50mmHg)[1]
SW:	0.0002g/kg(25°C)[2]
Specific gravity:	1.87(20°C)[10]
Molecular formula:	3.78[1]

[11-3] *γ*-HCH (synonym:Lindane)



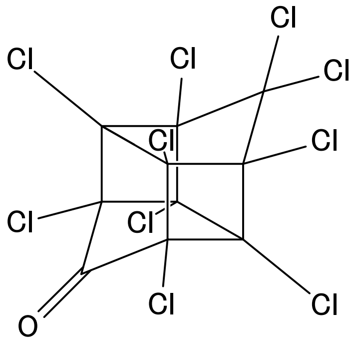
Molecular formula:	$C_6H_6Cl_6$
CAS:	58-89-9
ENCS:	3-2250、9-1652
MW:	290.83
mp:	112.5°C[1]
bp:	323.4°C[1]
SW:	0.0078g/kg(25°C)[1]
Specific gravity:	1.85(20°C)[10]
Molecular formula:	3.72[3]

[11-4] *δ*-HCH



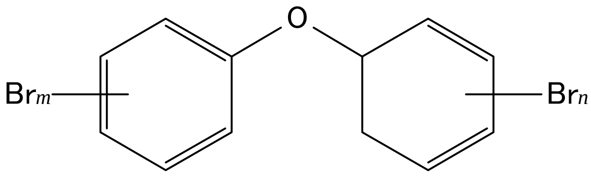
Molecular formula:	$C_6H_6Cl_6$
CAS:	319-86-8
ENCS:	3-2250、9-1652
MW:	290.83
mp:	141.5°C[1]
bp:	60°C(0.36mmHg)[1]
SW:	Uncertain
Specific gravity:	1.87(20°C)[10]
Molecular formula:	4.14[3]

[12] Chlordecone



Molecular formula:	$C_{10}Cl_{10}O$
CAS:	143-50-0
ENCS:	No pertinence
MW:	490.64
mp:	350°C(Decomposition)[2)]
bp:	Uncertain
SW:	7.6mg/L(24°C)[5)]
Specific gravity:	1.61(25°C)[1)]
Molecular formula:	3.45[12)]

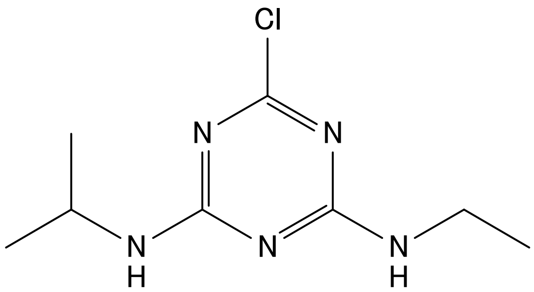
[13] Polybromodiphenyl ethers(Br_4～Br_{10})



i = m+n =4～10

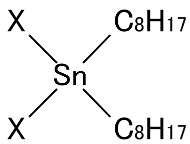
Molecular formula:	$C_{12}H_{(10-i)}Br_iO$(i = m+n =4～10)
CAS:	40088-47-9(Br_4), 32534-81-9(Br_5), 36483-60-0(Br_6), 68928-80-3(Br_7), 32536-52-0(Br_8), 63936-56-1(Br_9), 1163-19-5((Br_{10})
ENCS:	3-61(Br_4), 3-2845(Br_6)
MW:	485.79～959.17
mp:	Not specified
bp:	Not specified
SW:	Not specified
Specific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

[14] 2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine(synonym:Atrazine)



Molecular formula:	$C_8H_{14}ClN_5$
CAS:	1912-24-9
ENCS:	5-3851
MW:	215.68
mp:	171～174°C[2)]
bp:	Uncertain
SW:	70ppm(25°C)[2)]
Specific gravity:	1.2[13)]
Molecular formula:	2.34[13)]

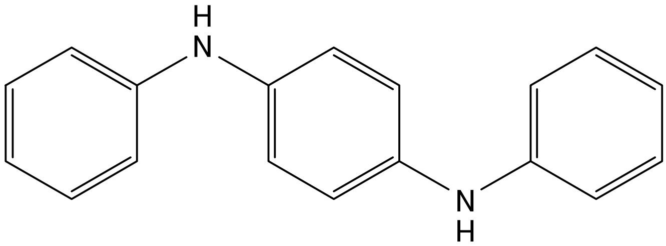
[15] Dioctyltin compounds



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
Molecular formula:	Not specified

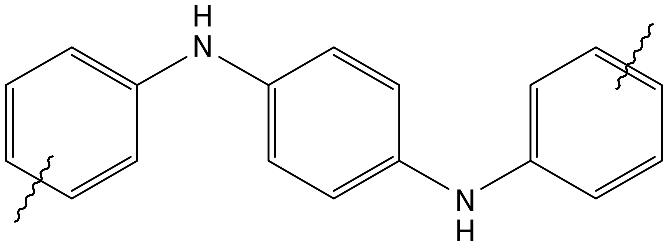
[16] *N*,*N'*-Diphenyl-*p*-phenylenediamines

[16-1] *N*,*N'*-Diphenyl-*p*-phenylenediamine



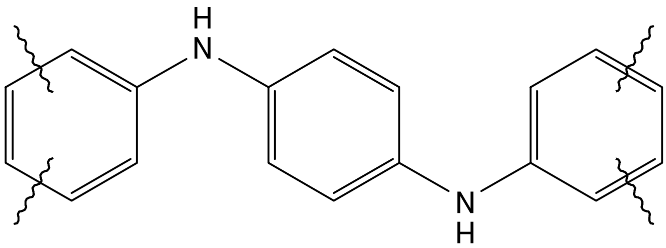
Molecular formula:	$C_{18}H_{16}N_2$
CAS:	74-31-7
ENCS:	3-145
MW:	260.33
mp:	150～151°C[2]
bp:	220～225°C(0.5mmHg)[2]
SW:	Uncertain
Specific gravity:	1.2[2]
Molecular formula:	Uncertain

[16-2] *N*,*N'*-Ditolyl-*p*-phenylenediamine



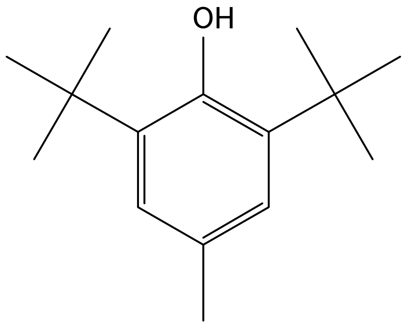
Molecular formula:	$C_{20}H_{20}N_2$
CAS:	27417-40-9
ENCS:	3-146、3-365、4-332
MW:	288.39
mp:	Uncertain
bp:	Uncertain
SW:	Uncertain
Specific gravity:	Uncertain
Molecular formula:	Uncertain

[16-3] *N*,*N'*-Dixylyl-*p*-phenylenediamine



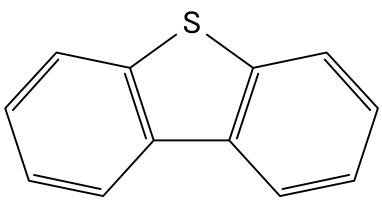
Molecular formula:	$C_{22}H_{24}N_2$
CAS:	28726-30-9
ENCS:	3-146
MW:	316.44
mp:	Uncertain
bp:	Uncertain
SW:	Uncertain
Specific gravity:	Uncertain
Molecular formula:	Uncertain

[17] 2,6-Di-*tert*-butyl-4-methylphenol (synonym:BHT)



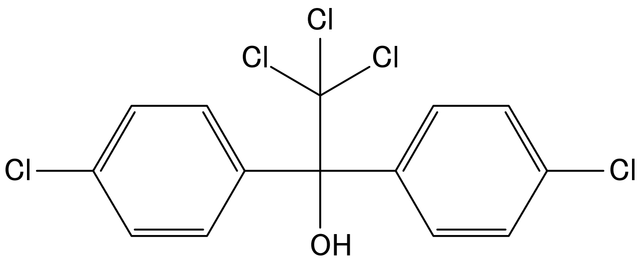
Molecular formula:	$C_{15}H_{24}O$
CAS:	128-37-0
ENCS:	3-540、9-1805
MW:	220.35
mp:	70°C[2]
bp:	265°C[2]
SW:	0.00006g/100mL(25°C)[14]
Specific gravity:	1.048(20/4°C)[2]
Molecular formula:	5.63[3]

[18] Dibenzothiophene



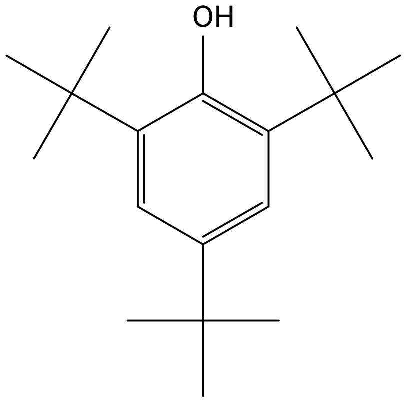
Molecular formula:	$C_{12}H_8S$
CAS:	132-65-0
ENCS:	5-3352
MW:	184.26
mp:	98.2°C[1]
bp:	332.5°C[1]
SW:	0.00103g/kg(25°C)[1]
Specific gravity:	Uncertain
Molecular formula:	4.38[3]

[19] 2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym:Kelthane or Dicofol)



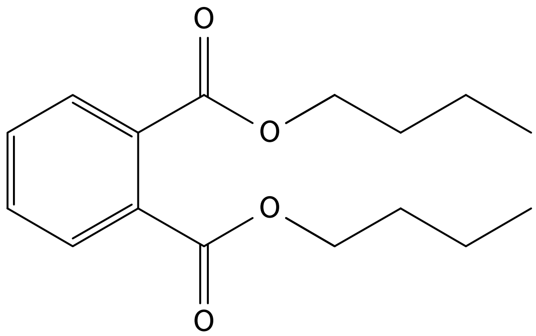
Molecular formula:	$C_{14}H_9Cl_5O$
CAS:	115-32-2
ENCS:	4-226
MW:	370.49
mp:	77～78°C[2]
bp:	180°C(0.1mmHg)[1]
SW:	0.0013g/kg(25°C)[1]
Specific gravity:	1.13[15]
Molecular formula:	4.28[15]

[20] 2,4,6-Tri-*tert*-butylphenol



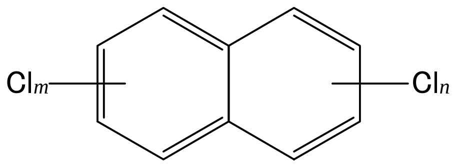
Molecular formula:	$C_{18}H_{30}O$
CAS:	732-26-3
ENCS:	3-540
MW:	262.43
mp:	131°C[1]
bp:	278°C[1]
SW:	35mg/L(25°C)[5]
Specific gravity:	0.864g/cm^3(27°C)[1]
Molecular formula:	6.06[5]

[21] Di-*n*-butyl phthalate



Molecular formula:	$C_{16}H_{22}O_4$
CAS:	84-74-2
ENCS:	3-1303
MW:	278.34
mp:	-35°C[1]
bp:	340°C[2]
SW:	0.0112g/kg(25°C)[1]
Specific gravity:	1.0459(20°C)[2]
Molecular formula:	4.50[16]

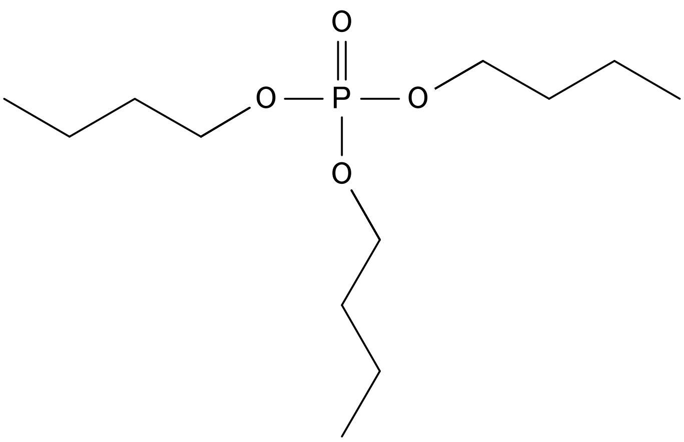
[22] Polychlorinated naphthalenes



i = m+n =1～8

Molecular formula:	$C_{10}H_{(8-i)}Cl_i$(i = m+n =1～8)
CAS:	70776-03-3 、 255860-43-0(Cl_1), 28699-88-9(Cl_2), 1321-65-9(Cl_3), 1335-88-2(Cl_4), 1321-64-8(Cl_5), 1335-87-1(Cl_6), 32241-08-0(Cl_7), 2234-13-1(Cl_8)
ENCS:	4-316(Cl_1), 4-317($Cl_{3\sim5}$)
MW:	138.59～379.71
mp:	Not specified
bp:	Not specified
SW:	Not specified
Specific gravity:	Not specified
Molecular formula:	Not specified

[23] Tri-*n*-butyl phosphate



Molecular formula:	$C_{12}H_{27}O_4P$
CAS:	126-73-8
ENCS:	2-2021
MW:	266.31
mp:	<-80°C[2]
bp:	289°C(Decomposition)[2]
SW:	0.39g/kg(25°C)[1]
Specific gravity:	0.976(25/25°C)[2]
Molecular formula:	4.00[3]

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8) Biggar et al., Apparent solubility of organochlorine insecticides in water at various temperatures, Hilgardia, 42, 383-391 (1974)
9) IPCS, International Chemical Safety Cards, alpha-Hexachlorocyclohexane ICSC0795 (1998)
10) ATSDR, Toxicological Profile for alpha-, beta-, gamma- and delta-Hexachlorocyclohexane (2005)
11) IPCS, International Chemical Safety Cards, beta-Hexachlorocyclohexane ICSC0796 (1998)
12) IPCS, International Chemical Safety Cards, Chlordecone ICSC1432 (2003)
13) IPCS, International Chemical Safety Cards, Atrazine ICSC0099 (1994)
14) IPCS, International Chemical Safety Cards, Butylated hydroxytoluene ICSC0841 (1999)
15) IPCS, International Chemical Safety Cards, Dicofol ICSC0752 (2003)
16) Ellington et al., Octanol/water partition coefficients for eight phthalate esters, U.S.EPA (1996)

3. Monitored site and procedure

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

(1) Organisations responsible for sampling

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

Local communities	Organisations responsible for sampling	Monitored media			
		Surface water	Sediment	Wildlife	Air
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	○	○		
Kumamoto Pref.	Kumamoto Prefectural Institute of Public Health and Environmental Science	○			○
Oita Pref.	Environmental Preservation Division, Life and Environment Department		○		
Miyazaki Pref.	Miyazaki Prefectural Institute for Public Health and Environment	○	○		○
Kagoshima Pref.	Kagoshima Prefectural Institute for Environmental Research and Public Health	○	○	○	○
Okinawa Pref.	Okinawa Prefectural Institute of Health and Environment	○	○	○	○

(Note) Organisations responsible for sampling are described by their official names in FY 2008.

(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	42	22	48	1
Sediment	48	21	64	3
Wildlife (bivalves)	7	22	7	5
Wildlife (fish)	15	22	17	5
Wildlife (birds)	2	22	2	5
Air (warm season)	35	14	37	1*
Air (cold season)	35	14	37	1*
All media	58	23	103	

(Note) For target chemicals [17] 2,6-Di-*tert*-butyl-4-methylphenol (synonym:BHT) and [20] 2,4,6-Tri-*tert*-butylphenol, 3 specimens were sampled at each sites, in both warm and cold seasons.

Table 3-1-1 List of monitored sites (surface water) in the Environmental Monitoring in FY 2008

Local communities	Monitored sites	Sampling dates
Hokkaido	Suzuran-ohashi Bridge, Riv Tokachi(Obihiro City)	October 9, 2008
	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City)	October 21, 2008
Aomori Pref.	Lake Jusan	October 3, 2008
Iwate Pref.	Riv. Toyosawa(Hanamaki City)	October 1, 2008
Miyagi Pref.	Sendai Bay(Matsushima Bay)	October 1, 2008
Akita Pref.	Lake Hachiro	September 30, 2008
Yamagata Pref.	Mouth of Riv. Mogami(Sakata City)	November 27, 2008
Fukushima Pref.	Onahama Port	November 18, 2008
Ibaraki Pref.	Tonekamome-ohasi Bridge, Mouth of Riv. Tone(Kamisu City)	November 11, 2008
Tochigi Pref.	Riv. Tagawa(Utsunomiya City)	October 17, 2008
Chiba City	Mouth of Riv. Hanami(Chiba City)	November 25, 2008
Tokyo Met.	Mouth of Riv. Arakawa(Koto Ward)	October 29, 2008
	Mouth of Riv. Sumida(Minato Ward)	October 29, 2008
Yokohama City	Yokohama Port	October 30, 2008
Kawasaki City	Keihin Canal, Port of Kawasaki	November 18, 2008
Niigata Pref.	Lower Riv. Shinano(Niigata City)	November 5, 2008
Toyama Pref.	Hagiura-bashi Bridge, Mouth of Riv. Jintsu(Toyama City)	November 25, 2008
Ishikawa Pref.	Mouth of Riv. Sai(Kanazawa City)	September 25, 2008
Fukui Pref.	Mishima-bashi Bridge, Riv. Shono(Tsuruga City)	October 1, 2008
Nagano Pref.	Lake Suwa(center)	November 5, 2008
Shizuoka Pref.	Riv. Tenryu(Iwata City)	November 11, 2008
Aichi Pref.	Nagoya Port	October 20, 2008
Mie Pref.	Yokkaichi Port	October 28, 2008
Shiga Pref.	Lake Biwa(center, offshore of Karasaki)	November 18, 2008
Kyoto Pref.	Miyazu Port	November 11, 2008
Kyoto City	Miyamae-bashi Bridge, Miyamae Bridge, Riv. Katsura(Kyoto City)	November 11, 2008
Osaka Pref.	Mouth of Riv. Yamato(Sakai City)	November 5, 2008
Osaka City	Osaka Port	October 21, 2008
Hyogo Pref.	Offshore of Himeji	October 27, 2008
Kobe City	Kobe Port(center)	December 10, 2008
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa(Wakayama City)	October 30, 2008
Okayama Pref.	Offshore of Mizushima	October 22, 2008
Hiroshima Pref.	Kure Port	November 5, 2008
	Hiroshima Bay	November 5, 2008
Yamaguchi Pref.	Tokuyama Bay	October 9, 2008
	Offshore of Ube	October 16, 2008
	Offshore of Hagi	October 29, 2008
Tokushima Pref.	Mouth of Riv. Yoshino(Tokushima City)	October 27, 2008
Kagawa Pref.	Takamatsu Port	November 25, 2008
Kochi Pref.	Mouth of Riv. Shimanto(Shimanto City)	October 20, 2008
Kitakyushu City	Dokai Bay	October 24, 2008
Saga Pref.	Imari Bay	November 11, 2008
Nagasaki Pref.	Omura Bay	November 13, 2008
Kumamoto Pref.	Riv. Midori(Uto City)	October 29, 2008
Miyazaki Pref.	Mouth of Riv. Oyodo(Miyazaki City)	October 15, 2008
Kagoshima Pref.	Riv. Amori(Kirishima City)	November 11, 2008
	Gotanda-bashi Bridge, Riv. Gotanda(Ichikikushikino City)	November 26, 2008
Okinawa Pref.	Naha Port	October 7, 2008

Figure 3-1-1 Monitored sites (surface water) in the Environmental Monitoring in FY 2008

Table 3-1-2 List of monitored sites (sediment) in the Environmental Monitoring in FY 2008

Local communities	Monitored sites	Sampling dates
Hokkaido	Onnenai-ohashi Bridge, Riv. Teshio(Bifuka Town)	October 8, 2008
	Suzuran-ohashi Bridge, Riv Tokachi(Obihiro City)	October 9, 2008
	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City)	October 21, 2008
	Tomakomai Port	September 22, 2008
Aomori Pref.	Lake Jusan	October 3, 2008
Iwate Pref.	Riv. Toyosawa(Hanamaki City)	October 1, 2008
Miyagi Pref.	Sendai Bay(Matsushima Bay)	October 1, 2008
Sendai City	Hirose-ohashi Bridge, Riv. Hirose(Sendai City)	October 28, 2008
Akita Pref.	Lake Hachiro	September 30, 2008
Yamagata Pref.	Mouth of Riv. Mogami(Sakata City)	November 27, 2008
Fukushima Pref.	Onahama Port	November 18, 2008
Ibaraki Pref.	Tonekamome-ohasi Bridge, Mouth of Riv. Tone(Kamisu City)	November 11, 2008
Tochigi Pref.	Riv. Tagawa(Utsunomiya City)	October 17, 2008
Chiba Pref.	Coast of Ichihara and Anegasaki	October 27, 2008
Chiba City	Mouth of Riv. Hanami (Chiba City)	November 25, 2008
Tokyo Met.	Mouth of Riv. Arakawa (Koto Ward)	October 29, 2008
	Mouth of Riv. Sumida (Minato Ward)	October 29, 2008
Yokohama City	Yokohama Port	October 30, 2008
Kawasaki City	Mouth of Riv. Tama(Kawasaki City)	November 18, 2008
	Keihin Canal, Port of Kawasaki	November 18, 2008
Niigata Pref.	Lower Riv. Shinano(Niigata City)	November 5, 2008
Toyama Pref.	Hagiura-bashi Bridge, Mouth of Riv. Jintsu(Toyama City)	November 25, 2008
Ishikawa Pref.	Mouth of Riv. Sai(Kanazawa City)	September 25, 2008
Fukui Pref.	Mishima-bashi Bridge, Riv. Shono(Tsuruga City)	October 1, 2008
Yamanashi Pref.	Senshu-bashi Bridge, Riv. Arakawa(Kofu City)	November 11, 2008
Nagano Pref.	Lake Suwa(center)	November 5, 2008
Shizuoka Pref.	Shimizu Port	November 26, 2008
	Riv. Tenryu(Iwata City)	November 11, 2008
Aichi Pref.	Kinuura Port	October 20, 2008
	Nagoya Port	October 20, 2008
Mie Pref.	Yokkaichi Port	October 28, 2008
	Toba Port	October 21, 2008
Shiga Pref.	Lake Biwa(center, offshore of Minamihira)	November 18, 2008
	Lake Biwa(center, offshore of Karasaki)	November 18, 2008
Kyoto Pref.	Miyazu Port	November 11, 2008
Kyoto City	Miyamae Bridge, Riv. Katsura(Kyoto City)	November 11, 2008
Osaka Pref.	Mouth of Riv. Yamato(Sakai City)	November 5, 2008
Osaka City	Osaka Port	October 21, 2008
	Outside Osaka Port	October 21, 2008
	Mouth of Riv. Yodo(Osaka City)	October 21, 2008
	Riv. Yodo(Osaka City)	October 15, 2008
Hyogo Pref.	Offshore of Himeji	October 27, 2008
Kobe City	Kobe Port(center)	December 10, 2008
Nara Pref.	Riv. Yamato(Ooji Town)	October 7, 2008
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa(Wakayama City)	October 30, 2008
Okayama Pref.	Offshore of Mizushima	October 22, 2008
Hiroshima Pref.	Kure Port	November 5, 2008
	Hiroshima Bay	November 5, 2008
Yamaguchi Pref.	Tokuyama Bay	October 9, 2008
	Offshore of Ube	October 16, 2008
	Offshore of Hagi	October 29, 2008
Tokushima Pref.	Mouth of Riv. Yoshino(Tokushima City)	October 27, 2008
Kagawa Pref.	Takamatsu Port	November 25, 2008
Ehime Pref.	Niihama Port	October 29, 2008
Kochi Pref.	Mouth of Riv. Shimanto(Shimanto City)	October 20, 2008
Kitakyushu City	Dokai Bay	October 24, 2008
Fukuoka City	Hakata Bay	November 4, 2008
Saga Pref.	Imari Bay	November 11, 2008
Nagasaki Pref.	Omura Bay	November 13, 2008
Oita Pref.	Mouth of Riv. Oita(Oita City)	December 8, 2008
Miyazaki Pref.	Mouth of Riv. Oyodo(Miyazaki City)	October 15, 2008
Kagoshima Pref.	Riv. Amori(Kirishima City)	November 11, 2008
	Gotanda-bashi Bridge, Riv. Gotanda (Ichikikushikino City)	November 26, 2008
Okinawa Pref.	Naha Port	October 7, 2008

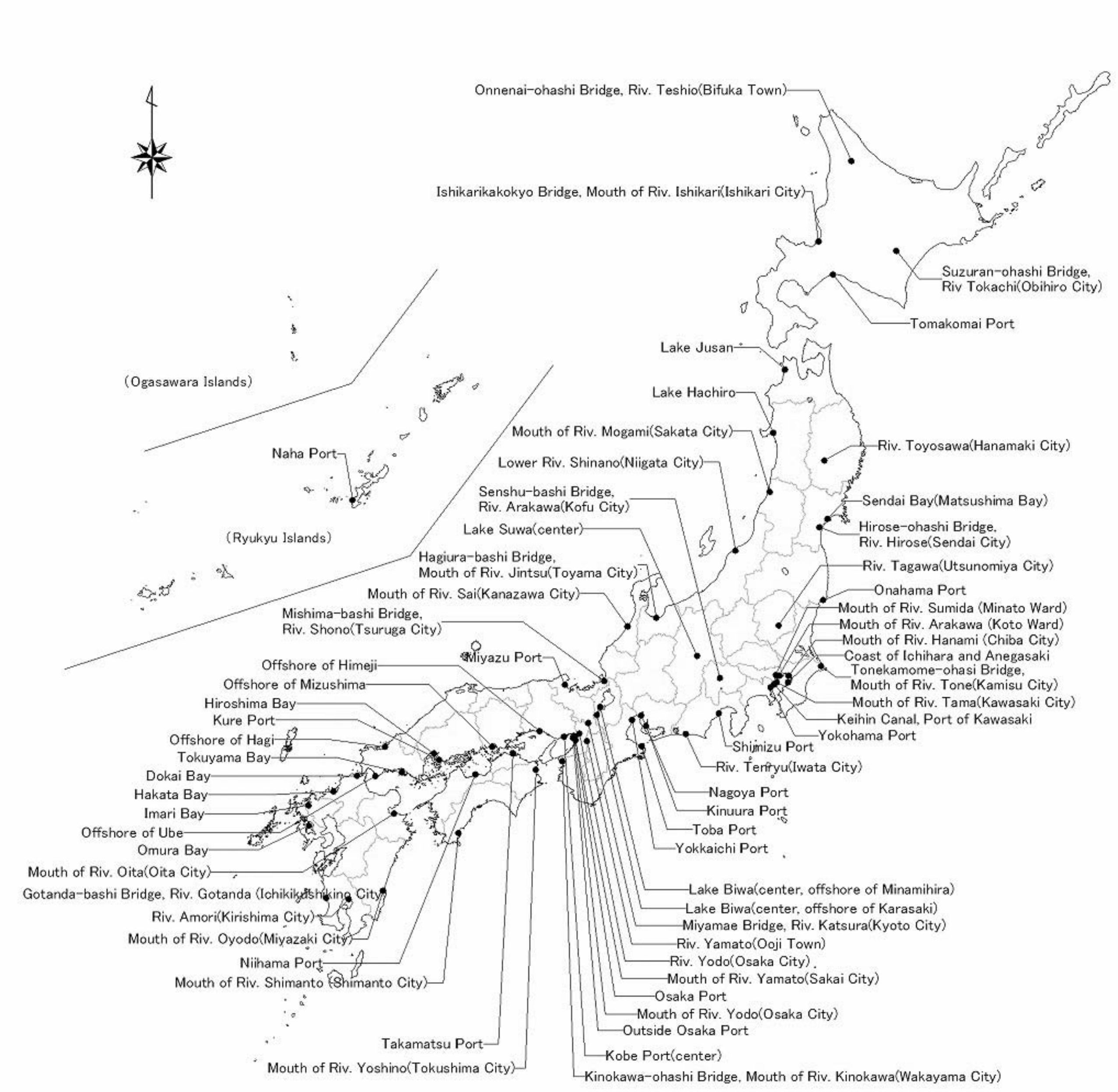

Figure 3-1-2 Monitored sites (sediment) in the Environmental Monitoring in FY 2008

Table 3-1-3 List of monitored areas (wildlife) in the Environmental Monitoring in FY 2008

Local communities	Monitored sites	Sampling dates	Wildlife species	
Hokkaido	Offshore of Kushiro	October 20, 2008	Fish	Rock greenling*(Hexagrammos otakki)*
		October 20, 2008	Fish	Chum salmon *(Oncorhynchus keta)*
	Offshore of Japan Sea(offshore of Iwanai)	November 11, 2008	Fish	Greenling *(Hexagrammos lagocephalus)*
Aomori Pref.	Kabu Is(Hachinohe City)	July 4, 2008	Birds	Black-taild gull *(Larus crassirostris)*
Iwate Pref.	Yamada Bay	October 3, 2008	Bivalves	Blue mussel*(Mytilus galloprovincialis)*
		October 27, 2008	Fish	Greenling *(Hexagrammos lagocephalus)*
	Suburb of Morioka City	September 24, 2008	Birds	Gray starling *(Sturnus cineraceus)*
Miyagi Pref.	Sendai Bay(Matsushima Bay)	October 29, 2008	Fish	Sea bass *(Lateolabrax japonicus)*
Ibaraki Pref.	Offshore of Joban	November 21, 2008	Fish	Pacific saury *(Cololabis saira)*
Tokyo Met.	Tokyo Bay	September 4, 2008	Fish	Sea bass (Lateolabrax japonicus)
Yokohama City	Yokohama Port	January 26, 2009	Bivalves	Blue mussel*(Mytilus galloprovincialis)*
Kawasaki City	Offshore of Ogishima Island, Port of Kawasaki	October 6, 2008	Fish	Sea bass *(Lateolabrax japonicus)*
Ishikawa Pref.	Coast of Noto Peninsula	October 8, 2008	Bivalves	Blue mussel(Mytilus galloprovincialis)
Shiga Pref.	Lake Biwa, Riv. Azumi (Takashima City)	April 2, 2008	Fish	Dace *(Tribolodon hakonensis)*
Osaka Pref.	Osaka Bay	August 4, 2008	Fish	Sea bass *(Lateolabrax japonicus)*
Hyogo Pref.	Offshore of Himeji	November 25, 2008	Fish	Sea bass *(Lateolabrax japonicus)*
Tottori Pref.	Nakaumi	November 5, 2008	Fish	Sea bass *(Lateolabrax japonicus)*
Shimane Pref.	Shichirui Bay, Shimane Peninsula	September 23, 2008	Bivalves	Blue mussel*(Mytilus galloprovincialis)*
Hiroshima City	Hiroshima Bay	November 20, 2008	Fish	Sea bass *(Lateolabrax japonicus)*
Tokushima Pref.	Naruto	November 25, 2008	Bivalves	Hard-shelled mussel *(Mytilus coruscus)*
Kagawa Pref.	Takamatsu Port	October 28, 2008	Bivalves	Hard-shelled mussel *(Mytilus coruscus)*
Kochi Pref.	Mouth of Riv. Shimanto (Shimanto City)	October 20, 2008	Fish	Sea bass *(Lateolabrax japonicus)*
Kitakyushu City	Dokai Bay	July 29, 2008	Bivalves	Blue mussel*(Mytilus galloprovincialis)*
Oita Pref.	Mouth of Riv. Oita(Oita City)	December 8, 2008	Fish	Sea bass *(Lateolabrax japonicus)*
Kagoshima Pref.	West Coast of Satsuma Peninsula	November 21, 2008	Fish	Sea bass *(Lateolabrax japonicus)*
Okinawa Pref.	Nakagusuku Bay	February 4, 2009, February 13, 2009	Fish	Okinawa seabream*(Acanthopagrus sivicolus)*

Figure 3-1-3 Monitored areas (wildlife) in the Environmental Monitoring in FY 2008

Table 3-1-4 List of monitored sites (air) in the Environmental Monitoring in FY 2008

Local communities	Monitored sites	Sampling dates (Warm season)	Sampling dates (Cold season)
Hokkaido	Kamikawa Health and Welfare Office (Nayoro City)	September 9～12, 2008	December 2～5, 2008
Sapporo City	Sapporo Art Park(Sapporo City)	September 30～October 3, 2008	December 2～5, 2008
Iwate Pref.	Amihari Ski Area(Shizukuishi Town)	September 9～12, 2008	October 28～31, 2008
Miyagi Pref.	Miyagi Prefectural Institute of Public Health and Environment(Sendai City)	September 17～24* or 9～12**, 2008	December 4～11* or 8～11**, 2008
Ibaraki Pref.	Ibaraki Kasumigaura Environmental Science Center(Tsuchiura City)	September 17～24* or 14～17**, 2008	November 19～26* or 19～22**, 2008
Gunma Pref.	Gunma Prefectural Institute of Public Health and Environmental Sciences(Maebashi City)	September 24～October 1* or September 24～26, 2008 and 29～30**, 2008	December 1～8* or 1～4**, 2008
Chiba Pref.	Ichihara-Matsuzaki Air Quality Monitoring Station(Ichihara City)	September 29～October 2, 2008	November 17～20, 2008
Tokyo Met.	Tokyo Metropolitan Research Institute for Environmental Protection(Koto Ward)	September 5～12* or 9～11, 2008 and 12～13**, 2008	November 10～17* or 10～13**, 2008
	Chichijima Island	September 20～27* or 20～23**, 2008	November 24～December 1* or November 24～27**, 2008
Kanagawa Pref.	Kanagawa Environmental Research Center(Hiratsuka City)	September 29～October 2, 2008	November 10～13, 2008
Yokohama City	Yokohama Environmental Science Research Institute(Yokohama City)	September 12～19* or 16～19**, 2008	November 14～21* or 18～21**, 2008
Niigata Pref.	Oyama Air Quality Monitoring Station(Niigata City)	September 30～October 3* or September 29～October 2**, 2008	December 1～4, 2008
Toyama Pref.	Tonami Air Quality Monitoring Station(Tonami City)	September 16～19, 2008	November 25～28, 2008
Ishikawa Pref.	Ishikawa Prefectural Institute of Public Health and Environmental Science(Kanazawa City)	September 8～11, 2008	November 17～20, 2008
Yamanashi Pref.	Fujiyoshida Joint Prefectural GovernmentBuilding(Fujiyoshida City)	September 29～October 2* or September 29～October 1, 2008 and 2～3**, 2008	November 17～20, 2008
Nagano Pref.	Nagano Environmental Conservation Research Institute(Nagano City)	September 24～October 1* or September 24～27**, 2008	December 1～8* or 1～4**, 2008
Gifu Pref.	Gifu Prefectural Research Institute for Health and Environmental Sciences(Kakamigahara City)	September 9～12, 2008	November 17～20, 2008
Nagoya City	Chikusa Ward Heiwa Park(Nagoya City)	September 26～October 3* or September 30～October 3**, 2008	December 12～19* or 16～19**, 2008
Mie Pref.	Mie Prefecture Health and Environment Research Institute(Yokkaichi City)	September 8～11, 2008	December 15～18, 2008
Kyoto Pref.	Kyoto Prefecture Joyo Senior High School(Joyo City)	October 6～9* or October 6～8, 2008 and 9～10**, 2008	December 15～18, 2008
Osaka Pref.	Research Institute of Environment, Agriculture and Fisheries, Osaka Prefectural Government(Osaka City)	October 1～4, 2008	December 8～11, 2008
Hyogo Pref.	Hyogo Prefectural Institute of Public Health and Environmental Sciences(Kobe City)	September 22～25, 2008	December 10～13, 2008
Kobe City	Fukiai Air Quality Monitoring Station(Kobe City)	September 8～11, 2008	December 15～18, 2008
Nara Pref.	Tenri Air Quality Monitoring Station (Tenri City)	October 6～9, 2008	December 1～4, 2008
Shimane Pref.	Oki National Acid Rain Observatory(Okinoshima Town)	September 29～October 2, 2008	November 26～29* or 25～28**, 2008
Hiroshima City	Hiroshima City Kokutaiji Junior High School(Hiroshima City)	September 8～11* or 9～12**, 2008	November 17～20, 2008
Yamaguchi Pref.	Yamaguchi Prefectural Public Health and Environment(Yamaguchi City)	September 9～16* or 8～11**, 2008	December 2～9* or 2～5**, 2008
	Hagi City Government Building, Mishima Branch(Hagi City)	September 9～16* or 9～12**, 2008	December 2～9* or 2～5**, 2008
Tokushima Pref.	Tokushima Prefectural Institute of Public Health and Environmental Sciences(Tokushima City)	September 29～October 2, 2008	December 15～18, 2008

Local communities	Monitored sites	Sampling dates (Warm season)	Sampling dates (Cold season)
Kagawa Pref.	Takamatsu Joint Prefectural Government Building(Takamatsu City) Kagawa Prefectural Public Swimming Pool(Takamatsu City) as a reference site	September 25～October 2* or September 25～28**, 2008	November 26～December 3* or 26～29**, 2008
Ehime Pref.	Ehime Prefecture Government Building, Nanyo Branch(Uwajima City)	October 14～17, 2008	November 17～20, 2008
Fukuoka Pref.	Omuta City Government Building(Omuta City)	October 20～23, 2008	December 1～4, 2008
Saga Pref.	Saga Prefectural Environmental Research Center(Saga City)	September 22～29* or 16～19**, 2008	December 1～8* or 1～4**, 2008
Kumamoto Pref.	Kumamoto Prefectural Institute of Public Health and Environmental Science(Udo City)	October 6～9, 2008	November 17～20, 2008
Miyazaki Pref.	Miyazaki Prefectural Institute for Public Healthand Environment(Miyazaki City)	October 2～9* or 6～9**, 2008	December 1～8* or 1～4**, 2008
Kagoshima Pref.	Kagoshima Prefectural Institute forEnvironmental Research and Public Health(Kagoshima City)	September 8～11, 2008	November 25～26, 2008 and 27～29, 2008
Okinawa Pref.	Cape Hedo(Kunigami Village)	September 29～October 2, 2008	November 12～14, 2008 and 17～18, 2008

(Note) " * " means sampling dates for the target chemicals POPs and [22] Polychlorinated naphthalenes. " ** " means sampling dates for the target chemicals [17] 2,6-Di-*tert*-butyl-4-methylphenol (synonym:BHT) and [20] 2,4,6-Tri-*tert*-butylphenol.

Figure 3-1-4 Monitored sites (air) in the Environmental Monitoring in FY 2008

(3) Target species

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

The properties of the species determined as targets in the FY 2008 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*)	① Distributed worldwide, excluding tropical zones ② Adheres to rocks in inner bays and to bridge piers	・Yamada Bay ・Yokohama Port ・Coast of Noto Peninsula ・Shitirui Bay ・Dokai Bay	Follow-up of the environmental fate and persistency in specific areas	Monitored in the 5 areas with different levels of persistency
	Hard-shelled mussel (*Mytilus coruscus*)	① Distributed in various areas of southern Hokkaido and southward ② Adheres to rocks where the current is fast (1-10 m/s)	・Naruto ・Takamatsu Port	Follow-up of the environmental fate and persistency in specific areas	
Fish	Greenling (*Hexagrammos otakki*)	① Distributed from Hokkaido to southern Japan, the Korean Peninsula, and China ② Lives in shallow seas of 5-50 m depth from sea level	・Offshore of Iwanai ・Yamada Bay	Follow-up of the environmental fate and persistency in specific areas	
	Rock greenling (*Hexagrammos lagocephalus*)	① Lives in cold-current areas of Hidaka and eastward (Hokkaido) ② Larger than the greenling and eats fish smaller than its mouth size at the sea bottom	・Offshore of Kushiro	Follow-up of the environmental fate and persistency in specific areas	
	Pacific saury (*Cololabis saira*)	① Distributed widely in northern Pacific Ocean ② Migrates around Japanese Archipelago; in Chishima in autumn and northern Kyushu in winter ③ Bioaccumulation of chemicals is said to be moderate	・Offshore of Joban	Follow-up of the environmental fate and persistency around the Japanese archipelago	
	Chum salmon (*Oncorhynchus keta*)	① Distributed in northern Pacific Ocean, Sea of Japan, Bering Sea, Sea of Okhotsk, the whole of the Gulf of Alaska, and part of the Arctic Ocean ② Runs the Tone River on the Pacific Ocean side and rivers in Yamaguchi Prefecture and northward on the Sea of Japan side in Japan ③ Bioaccumulation of chemicals is said to be moderate	・Offshore of Kushiro	Follow-up of the environmental fate and persistency on a global scale	
	Sea bass (*Lateolabrax japonicus*)	① Distributed around the shores of various areas in Japan, the Korean Peninsula, and the coastal areas of China ② Sometimes lives in a freshwater environment and brackish-water regions during its life cycle ③ Bioaccumulation of chemicals is said to be high	・Matsushima Bay ・Tokyo Bay ・Kawasaki Port ・Osaka Bay ・Offshore of Himeji ・Nakaumi ・Hiroshima Bay ・Mouth of Riv. Shimanto ・Mouth of Riv. Oita(Oita City) ・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
	Okinawa seabeam (*Acanthopagrus sivicolus*)	① Distributed around Nansei Shoto (Ryukyu Islands) ② Lives in coral reefs and in bays into which rivers flow	・Kanagusuku Bay	Follow-up of the environmental fate and persistency in specific areas	
	Dace (*Tribolodon hakonensis*)	① Distributed widely in freshwater environments throughout Japan ② Preys mainly on insects	・Lake Biwa, Riv. Azumi (Takashima City)	Follow-up of the environmental fate and persistency in specific areas	

Species		Properties	Monitored areas	Aim of monitoring	Notes
Birds	Gray starling (*Sturnus cineraceus*)	① Distributed widely in the Far East (Related species are distributed worldwide) ② Eats primarily insects	・Morioka City	Follow-up of the environmental fate and persistency in northern Japan	
	Black-taild gull (*Larus crassirostris*)	① Breeds mainly in the sea off Japan ② Breeds in groups at shore reefs and in grassy fields	・Kabu Is. (Hachinohe City)	Follow-up of the environmental fate and persistency in specific areas	

Table 3-3-1 Basic data of specimens (bivalves as wildlife) in the Environmental Monitoring in FY 2008

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	October, 2008	Uncertain	99	32.1 ～ 87.7 (56.2)	8.2 ～ 10.6 (9.0)	77.8	2.2
	2		Uncertain	131	36.0 ～ 54.0 (44.7)	7.7 ～ 8.2 (8.1)	77.2	2.2
	3		Uncertain	241	26.1 ～ 43.9 (35.5)	7.2 ～ 7.6 (7.6)	77.1	2.1
	4		Uncertain	301	23.7 ～ 36.4 (29.7)	6.6 ～ 7.2 (6.9)	76.7	2.1
	5		Uncertain	391	14.7 ～ 27.1 (21.4)	5.3 ～ 6.6 (6.1)	77.1	2.0
Blue mussel *Mytilus galloprovincialis* (Yokohama Port)	1	January, 2009	Uncertain	252	1.3 ～ 3.2 (2.2)	2.2 ～ 3.2 (2.8)	88.9	0.7
	2		Uncertain	247	1.5 ～ 5.2 (2.5)	2.5 ～ 3.9 (2.9)	88.7	0.7
	3		Uncertain	262	1.4 ～ 3.4 (2.4)	2.3 ～ 3.5 (2.8)	89.2	0.6
	4		Uncertain	275	1.4 ～ 3.7 (2.2)	2.4 ～ 3.4 (2.8)	88.8	0.7
	5		Uncertain	233	1.4 ～ 5.0 (2.5)	2.3 ～ 3.8 (2.9)	88.4	0.7
Blue mussel *Mytilus galloprovincialis* (Coast of Noto Peninsula)	1	October, 2008	Uncertain	150	31.8 ～ 65.7 (49.6)	7.6 ～ 9.1 (8.4)	76.1	2.8
	2		Uncertain	180	21.7 ～ 51.8 (39.1)	7.3 ～ 8.3 (7.7)	76.5	2.7
	3		Uncertain	250	21.5 ～ 43.8 (29.6)	6.8 ～ 7.7 (7.2)	76.7	2.8
	4		Uncertain	240	16.7 ～ 35.9 (23.6)	6.0 ～ 7.3 (6.6)	77.1	2.6
	5		Uncertain	280	12.7 ～ 42.8 (23.4)	5.4 ～ 7.0 (6.4)	76.3	2.7
Blue mussel *Mytilus galloprovincialis* (Shitirui Bay)	1	September, 2008	Uncertain	460	22.6 ～ 226.2 (50.4)	6.5 ～ 13.0 (7.9)	72.4	2.2
	2		Uncertain	850	11.3 ～ 48.9 (25.7)	5.5 ～ 7.2 (6.3)	79.4	1.8
	3		Uncertain	900	5.0 ～ 12.1 (8.0)	3.2 ～ 5.1 (4.1)	78.1	2.0
	4		Uncertain	350	1.8 ～ 8.0 (5.0)	2.8 ～ 4.2 (3.6)	76.7	2.1
	5		Uncertain	800	4.2 ～ 9.9 (6.5)	3.4 ～ 4.3 (3.9)	80.7	1.8
Hard-shelled mussel *Mytilus coruscus* (Naruto)	1	November, 2008	Mixed	21	153.0 ～ 474.9 (348.7)	11.3 ～ 17.5 (15.3)	79	1.2
	2		Mixed	20	291.0 ～ 460.1 (398.6)	14.5 ～ 16.6 (15.5)	76	1.2
	3		Mixed	19	404.9 ～ 552.5 (477.2)	16.5 ～ 19.0 (17.2)	68	0.9
	4		Mixed	19	401.5 ～ 583.5 (502.7)	15.5 ～ 19.7 (17.8)	73	0.9
	5		Mixed	18	499.2 ～ 678.9 (561.0)	17.8 ～ 20.5 (18.9)	79	0.9
Hard-shelled mussel *Mytilus coruscus* (Takamatsu Port)	1	October, 2008	Uncertain	160	11.9 ～ 39.4 (21.5)	3.8 ～ 6.6 (4.9)	81.5	1.5
	2		Uncertain	179	6.4 ～ 35.6 (20.7)	2.1 ～ 6.0 (4.7)	82.2	1.4
	3		Uncertain	186	7.2 ～ 46.6 (18.3)	2.7 ～ 6.4 (4.4)	81.2	1.9
	4		Uncertain	240	6.9 ～ 65.6 (26.1)	2.6 ～ 6.9 (4.9)	83.8	1.4
	5		Uncertain	230	7.5 ～ 39.5 (18.4)	3.4 ～ 5.9 (4.4)	81.7	1.7
Blue mussel *Mytilus galloprovincialis* (Dokai Bay)	1	July, 2008	Mixed	500	2.0 ～ 11.3 (5.9)	2.7 ～ 5.2 (4.0)	78.4	3.1

Table 3-3-2 Basic data of specimens (fish as wildlife) in the Environmental Monitoring in FY 2008

Fish species (Area)	No.	Sampling month	Sex	Number of animals	Weight (g) (Average)	Length (cm) (Average)	Water content %	Lipid content %
Rock greenling	1		Female	5	705 ～ 880 (834)	32.3 ～ 37.0 (34.5)	77	2.9
Hexagrammos	2		Female	4	750 ～ 1,090 (855)	31.0 ～ 36.0 (33.3)	77	0.9
otakki	3	October, 2008	Female	5	535 ～ 730 (631)	29.5 ～ 31.5 (31.0)	78	1.5
(Offshore of	4		Female	5	540 ～ 710 (618)	29.0 ～ 32.5 (30.8)	78	1.8
Kushiro)	5		Female	5	605 ～ 1,040 (905)	30.5 ～ 37.0 (34.7)	78	3.7
Chum salmon	1		Female	1	2,930	54.0	77	2.1
Oncorhynchus	2	October, 2008	Female	1	3,260	61.0	75	2.1
keta	3		Male	1	2,740	60.5	73	3.3
(Offshore of	4		Male	1	2,050	61.0	73	3.4
Kushiro)	5		Male	1	3,810	66.0	74	2.7
Greenling	1		Mixed	7	310 ～ 580 (432)	25.5 ～ 30.5 (27.6)	75	4.0
Hexagrammos	2		Mixed	5	500 ～ 700 (594)	28.5 ～ 33.0 (30.7)	74	3.9
lagocephalus	3	November, 2008	Mixed	7	400 ～ 640 (484)	27.0 ～ 30.0 (28.2)	76	2.1
	4		Mixed	6	540 ～ 855 (701)	30.0 ～ 35.0 (32.2)	74	4.2
(Offshore of Iwanai)	5		Male	4	710 ～ 1,380 (918)	32.5 ～ 39.5 (35.3)	75	4.0
Greenling	1		Uncertain	4	702.8 ～ 943.5 (798.4)	36.8 ～ 40.2 (38.4)	73.1	6.1
Hexagrammos	2		Uncertain	5	632.6 ～ 732.8 (691.2)	35.2 ～ 36.8 (35.9)	72.1	6.6
lagocephalus	3	October, 2008	Uncertain	6	492.2 ～ 567.3 (542.5)	33.6 ～ 35.1 (34.1)	73.1	5.6
	4		Uncertain	6	433.5 ～ 552.8 (509.7)	31.9 ～ 33.5 (32.9)	73.0	5.8
(Yamada Bay)	5		Uncertain	9	241.9 ～ 441.1 (327.3)	25.5 ～ 31.7 (28.6)	74.1	4.2
Sea bass	1		Uncertain	12	193 ～ 370 (278)	24.3 ～ 29.5 (27.1)	78.3	1.0
Lateolabrax	2		Uncertain	11	190 ～ 334 (274)	24.5 ～ 31.0 (27.4)	77.9	1.0
japonicus	3	October, 2008	Uncertain	11	211 ～ 398 (294)	24.3 ～ 30.0 (26.8)	77.6	1.3
	4		Uncertain	13	200 ～ 440 (309)	23.4 ～ 31.2 (27.0)	77.3	1.3
(Matsushima Bay)	5		Uncertain	12	169 ～ 381 (268)	23.5 ～ 31.5 (27.2)	78.2	1.0
Pacific saury	1		Mixed	27	106 ～ 128 (118)	27 ～ 28 (28)	65.7	12.8
Cololabis saira	2		Mixed	20	128 ～ 134 (132)	27 ～ 30 (29)	63.5	15.1
	3	November, 2008	Mixed	19	135 ～ 140 (137)	27 ～ 30 (29)	62.0	15.9
(Offshore of	4		Mixed	22	141 ～ 159 (148)	28 ～ 31 (30)	60.5	19.0
Joban)	5		Mixed	20	114 ～ 160 (135)	27 ～ 31 (29)	63.4	14.8
Sea bass	1		Mixed	3	1,627 ～ 1,800 (1,694)	47.0 ～ 51.0 (48.8)	72.5	3.6
Lateolabrax	2		Mixed	3	1,151 ～ 1,506 (1,286)	43.8 ～ 47.8 (45.3)	73.9	3.6
japonicus	3	September, 2008	Mixed	5	1,011 ～ 1,207 (1,081)	41.0 ～ 43.5 (41.7)	75.7	3.0
	4		Mixed	5	880 ～ 1,072 (948)	40.6 ～ 41.0 (40.8)	76.2	2.9
(Tokyo Bay)	5		Mixed	5	810 ～ 1,010 (896)	38.2 ～ 40.0 (39.4)	73.4	2.4
Sea bass	1		Male	5	992 ～ 1,127 (1,050)	38.0 ～ 41.4 (39.8)	74.6	2.8
Lateolabrax	2		Male	5	903 ～ 1,074 (1,006)	39.2 ～ 42.5 (40.6)	75.3	2.1
japonicus	3	October, 2008	Female	5	942 ～ 1,083 (1,024)	39.5 ～ 42.5 (40.7)	77.1	1.5
	4		Female	5	937 ～ 1,095 (1,002)	41.0 ～ 41.7 (41.3)	75.0	2.0
(Kawasaki Port)	5		Female	5	916 ～ 1,095 (999)	37.5 ～ 41.5 (39.9)	75.8	2.0
Dace	1		Female	25	166 ～ 289 (216)	25.0 ～ 29.4 (26.6)	74.4	4.4
Tribolodon	2		Male	25	173 ～ 275 (221)	25.0 ～ 28.6 (26.7)	73.9	4.6
hakonensis	3	April, 2008	Female	26	200 ～ 307 (248)	25.0 ～ 29.1 (27.5)	74.1	4.8
(Lake Biwa, Riv.	4		Male	25	162 ～ 278 (210)	24.9 ～ 29.0 (26.4)	73.4	4.1
Azumi)	5		Female	22	189 ～ 244 (211)	25.0 ～ 27.1 (26.2)	74.3	3.8
Sea bass	1		Uncertain	7	587 ～ 660 (611)	31.5 ～ 34.0 (32.9)	76.4	3.3
Lateolabrax	2		Uncertain	7	609 ～ 667 (632)	32.0 ～ 33.5 (32.5)	76.4	3.2
japonicus	3	August, 2008	Uncertain	8	572 ～ 655 (614)	31.0 ～ 33.0 (32.1)	76.9	3.0
	4		Uncertain	8	539 ～ 646 (605)	30.0 ～ 34.0 (32.4)	77.5	2.2
(Osaka Bay)	5		Uncertain	8	492 ～ 633 (559)	29.5 ～ 33.5 (30.9)	76.5	2.9
Sea bass	1		Female	2	1,715 ～ 2,001 (1,858)	58.0 ～ 60.0 (59.0)	76.8	2.2
Lateolabrax	2	November, 2008	Female	2	1,892 ～ 2,053 (1,973)	58.0 ～ 61.0 (59.5)	76.6	2.1
japonicus	3		Male	2	1,824 ～ 1,871 (1,848)	60.0 ～ 60.0 (60.0)	76.7	1.3
(Offshore of	4		Male	2	1,499 ～ 1,635 (1,567)	62.0 ～ 64.5 (63.3)	77.6	1.2
Himeji)	5		Female	1	1,713	65.0	75.2	3.3

Fish species (Area)	No.	Sampling month	Sex	Number of animals	Weight (g) (Average)	Length (cm) (Average)	Water content %	Lipid content %
Sea bass *Lateolabrax japonicus* (Nakaumi)	1	November, 2008	Mixed	9	785 ～ 1,020 (851)	40.0 ～ 44.0 (41.3)	79.9	0.8
	2		Mixed	9	645 ～ 810 (747)	36.7 ～ 41.5 (39.2)	79.8	1.2
	3		Mixed	10	620 ～ 775 (671)	37.5 ～ 41.5 (39.4)	79.8	1.0
	4		Mixed	11	478 ～ 708 (577)	34.8 ～ 39.0 (36.7)	79.7	0.9
	5		Mixed	14	440 ～ 640 (503)	32.7 ～ 36.7 (34.4)	79.3	0.9
Sea bass *Lateolabrax japonicus* (Hiroshima Bay)	1	November, 2008	Female	2	692 ～ 2,591 (1,642)	38.0 ～ 54.0 (46.0)	77.9	1.1
	2		Male	6	466 ～ 733 (557)	33.5 ～ 38.0 (34.5)	78.7	0.9
	3		Female	6	504 ～ 672 (542)	33.5 ～ 36.5 (34.1)	78.5	0.7
	4		Female	7	439 ～ 515 (479)	32.0 ～ 33.0 (32.5)	78.6	1.0
	5		Female	7	401 ～ 527 (442)	30.5 ～ 32.0 (31.5)	78.9	1.4
Sea bass *Lateolabrax japonicus* (Mouth of Riv. Shimanto)	1	October, 2008	Mixed	9	233 ～ 375 (316)	25.1 ～ 27.0 (26.2)	76.0	1.0
	2		Mixed	11	245 ～ 333 (279)	22.8 ～ 26.0 (24.6)	73.9	1.2
	3		Mixed	11	221 ～ 320 (275)	22.0 ～ 26.0 (24.1)	75.7	1.1
	4		Mixed	15	145 ～ 269 (207)	19.5 ～ 24.6 (22.1)	77.1	1.2
	5		Mixed	45	39.3 ～ 161 (87.3)	12.1 ～ 21.2 (16.4)	76.0	0.9
Sea bass *Lateolabrax japonicus* (Mouth of Riv. Oita(Oita City))	1	December, 2008	Uncertain	1	2,493	58.0	76.6	1.3
	2		Uncertain	1	2,410	56.5	76.0	2.0
	3		Uncertain	1	2,630	59.0	77.3	1.0
	4		Uncertain	1	2,682	57.5	77.8	3.1
	5		Uncertain	1	2,799	59.0	72.9	1.9
Sea bass *Lateolabrax japonicus* (West Coast of Satsuma Peninsula)	1	November, 2008	Mixed	10	349.5 ～ 432.0 (400.5)	28.0 ～ 28.7 (28.4)	76.4	0.8
	2		Mixed	9	377.6 ～ 486.2 (438.9)	28.8 ～ 29.0 (29.0)	77.0	0.9
	3		Mixed	9	382.2 ～ 492.7 (427.5)	29.1 ～ 29.2 (29.2)	76.5	1.2
	4		Mixed	8	406.4 ～ 488.2 (460.0)	29.3 ～ 29.5 (29.4)	75.9	1.1
	5		Mixed	8	455.6 ～ 514.0 (479.7)	29.8 ～ 30.5 (30.2)	76.3	0.9
Okinawa seabeam *Acanthopagrus sivicolus* (Nakagusuku Bay)	1	February, 2009	Female	3	1,040 ～ 1,320 (1,180)	32.0 ～ 35.0 (33.2)	77.4	1.8
	2		Mixed	4	800 ～ 1,000 (880)	30.5 ～ 32.0 (31.0)	78.1	0.6
	3		Female	4	740 ～ 800 (770)	28.0 ～ 31.0 (29.6)	79.3	0.8
	4		Mixed	5	620 ～ 700 (656)	27.5 ～ 30.5 (28.8)	78.4	0.6
	5		Mixed	6	560 ～ 620 (573)	26.5 ～ 29.0 (27.2)	78.7	0.8

Table 3-3-3 Basic data of specimens (birds as wildlife) in the Environmental Monitoring in FY 2008

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, 2008	Uncertain	39	262 ～ 587 (384)	28 ～ 49 (39)	72.9	4.0
	2		Uncertain	53	219 ～ 509 (359)	30 ～ 46 (39)	73.4	3.6
	3		Uncertain	41	243 ～ 460 (343)	31 ～ 53 (42)	73.9	3.0
	4		Uncertain	32	273 ～ 591 (384)	36 ～ 51 (41)	73.0	3.9
	5		Uncertain	24	269 ～ 589 (406)	37 ～ 48 (45)	73.0	4.1
Gray starling *Sturnus cineraceus* (Morioka City)	1	September, 2008	Male	26	81.8 ～ 98.8 (90.5)	12.9 ～ 13.5 (13.1)	70.6	2.9
	2		Male	26	71.1 ～ 100.9 (85.4)	11.7 ～ 12.8 (12.4)	70.9	3.2
	3		Female	26	74.5 ～ 100.0 (89.8)	12.7 ～ 13.4 (13.0)	70.4	3.0
	4		Female	26	72.4 ～ 96.2 (84.7)	11.4 ～ 12.7 (12.2)	70.1	3.0
	5		Uncertain	26	72.8 ～ 98.6 (85.1)	11.6 ～ 13.4 (12.5)	69.4	3.3

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 2008 were statistically analyzed together with the previous monitoring results, accumulated over the past 7 years (or 6 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 7 years (or 6 years). The results of the analyses are shown in Table 3-6

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

・For surface water

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

・For air

At each monitored site, the first sampling was for the monitoring in the warm season (September 5, 2008～ October 23, 2008) and the second was for that in the cold season (October 28, 2008～December 19, 2008).

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

○Method for regression analysis and testing

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

Using the monitoring results between FY 2002～2008 (FY 2003～2008 for air) successively measured at the same site or area,

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

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

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

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

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

Table 3-4-1 List of the detection ranges in the Environmental Monitoring in FY 2008 (Part 1)

No	Target chemicals	Surface water (pg/L)		Sediment (pg/g-dry)	
		Range (Frequency)	Av.	Range (Frequency)	Av.
[1]	Polychlorinated biphenyls (PCBs)	27～4,300 (48/48)	260	22～630,000 (64/64)	7,400
[2]	HCB	4～480 (48/48)	16	4.4～29,000 (64/64)	140
[3]	Aldrin	nd～21 (26/48)	tr(0.8)	nd～370 (56/64)	5
[4]	Dieldrin	3.6～450 (48/48)	36	tr(0.7)～2,900 (64/64)	42
[5]	Endrin	nd～20 (45/48)	3	nd～38,000 (61/64)	8.7
[6]	DDTs	11～2,600 (48/48)	81	23～2,000,000 (64/64)	2,100
	[6-1] *p,p'*-DDT	nd～1,200 (47/48)	11	4.8～1,400,000 (64/64)	210
	[6-2] *p,p'*-DDE	2.5～350 (48/48)	27	9.0～96,000 (64/64)	780
	[6-3] *p,p'*-DDD	2.0～850 (48/48)	22	2.8～300,000 (64/64)	610
	[6-4] *o,p'*-DDT	nd～230 (44/48)	3.1	tr(0.7)～140,000 (64/64)	39
	[6-5] *o,p'*-DDE	nd～260 (39/48)	1.5	nd～37,000 (63/64)	42
	[6-6] *o,p'*-DDD	nd～170 (47/48)	6.7	0.5～50,000 (64/64)	140
[7]	Chlordanes	10～1,400 (48/48)	78	tr(7)～34,000 (64/64)	320
	[7-1] *cis*-Chlordane	2.9～480 (48/48)	29	tr(2.3)～11,000 (64/64)	89
	[7-2] *trans*-Chlordane	3～420 (48/48)	23	2.4～10,000 (64/64)	93
	[7-3] Oxychlordane	nd～14 (40/48)	1.9	nd～340 (48/64)	tr(2)
	[7-4] *cis*-Nonachlor	0.9～130 (48/48)	6.5	1.1～5,100 (64/64)	49
	[7-5] *trans*-Nonachlor	1.9～340 (48/48)	18	tr(1.6)～8,400 (64/64)	79
[8]	Heptachlors	nd～37 (42/48)	5.7	nd～210 (37/64)	tr(4)
	[8-1] Heptachlor	nd～4.6 (19/48)	nd	nd～85 (27/64)	tr(1)
	[8-2] *cis*-Heptachlor epoxide	nd～37 (46/48)	4.7	nd～180 (51/64)	2
	[8-3] *trans*-Heptachlor epoxide	nd (0/48)	nd	nd (0/64)	nd
[9]	Toxaphenes				
	[9-1] Parlar-26	nd (0/48)	nd	nd (0/64)	nd
	[9-2] Parlar-50	nd (0/48)	nd	nd (0/64)	nd
	[9-3] Parlar-62	nd (0/48)	nd	nd (0/64)	nd
[10]	Mirex	nd～0.7 (4/48)	nd	nd～820 (48/64)	1.1
[11]	HCHs				
	[11-1] α-HCH	9～1,100 (48/48)	78	nd～5,200 (64/64)	120
	[11-2] β-HCH	15～1,800 (48/48)	150	2.8～8,900 (64/64)	170
	[11-3] γ-HCH (synonym:Lindane)	4～340 (48/48)	34	tr(0.7)～2,200 (64/64)	35
	[11-4] δ-HCH	tr(1.1)～1,900 (48/48)	11	nd～3,300 (64/64)	36

(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 2008 (Part 2)

No	Target chemicals	Surface water (pg/L)		Sediment (pg/g-dry)	
		Range (Frequency)	Av.	Range (Frequency)	Av.
[12]	Chlordecone	nd～0.76 (13/46)	nd	nd～5.8 (10/49)	nd
[13]	Polybromodiphenyl ethers(Br_4～Br_{10})				
	[13-1] Tetrabromodiphenyl ethers				
	[13-2] Pentabromodiphenyl ethers				
	[13-3] Hexabromodiphenyl ethers				
	[13-4] Heptabromo diphenyl ethers				
	[13-5] Octabromodiphenyl ethers				
	[13-6] Nonabromodiphenyl ethers				
	[13-7] Decabromodiphenyl ether				

(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) [shaded] means the medium was not monitored.

Table 3-4-3 List of the detection ranges in the Environmental Monitoring in FY 2008 (Part 3)

No	Target chemicals	Surface water (ng/L)		Sediment (ng/g-dry)	
		Range (Frequency)	Av.	Range (Frequency)	Av.
[14]	2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym:Atrazine)	nd～3.4 (19/48)	nd	nd～4.1 (10/59)	nd
[15]	Dioctyltin compounds	nd～10 (2/48)	nd	nd～90 (56/63)	0.71
[16]	*N*,*N'*-Diphenyl-*p*-phenylenediamines				
	[16-1] *N*,*N'*-Diphenyl-*p*-phenylenediamine	nd (0/48)	nd		
	[16-2] *N*,*N'*-Ditolyl-*p*-phenylenediamine	nd (0/48)	nd		
	[16-3] *N*,*N'*-Dixylyl-*p*-phenylenediamine	nd (0/48)	nd		
[17]	2,6-Di-*tert*-butyl-4-methyl phenol (synonym:BHT)	nd～7.8 (9/36)	nd	nd～300 (20/56)	nd
[18]	Dibenzothiophene	nd～3.9 (13/48)	nd	nd～79 (61/64)	1.6
[19]	2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym:Kelthane or Dicofol)	nd～0.076 (13/48)	nd	nd～0.46 (13/63)	nd
[20]	2,4,6-Tri-*tert*-butylphenol	nd (0/48)	nd	nd～17 (1/63)	nd
[21]	Di-*n*-butyl phthalate	nd～660 (18/45)	tr(75)	nd～780 (22/62)	nd
[22]	Polychlorinated naphthalenes	nd～0.18 (9/48)	nd	nd～28 (58/63)	0.36
[23]	Tri-*n*-butyl phosphate	nd～94 (29/43)	tr(11)	nd～19 (41/60)	tr(0.79)

(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) [shaded] means the medium was not monitored.

Table 3-4-4 List of the detection ranges in the Environmental Monitoring in FY 2008 (Part 4)

No	Target chemicals	Wildlife (pg/g-wet)						Air (pg/m^3)			
		Bivalves		Fish		Birds		First (Warm season)		Second (Cold season)	
		Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.
[1]	Polychlorinated biphenyls (PCBs)	870～69,000 (7/7)	6,600	1,200～330,000 (17/17)	11,000	3,000～56,000 (2/2)	8,800	52～960 (22/22)	200	21～1,500 (36/36)	93
[2]	HCB	13～240 (7/7)	30	25～1,500 (17/17)	160	240～2,500 (2/2)	850	78～260 (22/22)	120	58～160 (36/36)	87
[3]	Aldrin	nd～20 (3/7)	nd	nd～tr(2) (1/17)	nd	nd (0/2)	nd	tr(0.02)～9.4 (25/25)	0.27	nd～1.3 (22/25)	0.09
[4]	Dieldrin	47～24,000 (7/7)	310	15～1,300 (17/17)	230	260～1,300 (2/2)	620	1.6～220 (37/37)	14	0.68～72 (37/37)	4.9
[5]	Endrin	tr(6)～1,500 (7/7)	26	nd～200 (14/17)	11	nd～83 (1/2)	10	tr(0.06)～4.6 (37/37)	0.53	nd～1.8 (35/37)	0.18
[6]	DDTs	420～9,000 (7/7)	1,600	430～73,000 (17/17)	3,500	7,700～160,000 (2/2)	45,000	2.5～140 (37/37)	12	1.8～34 (37/37)	4.7
	[6-1] *p,p'*-DDT	12～1,400 (7/7)	130	7～2,900 (17/17)	270	56～270 (2/2)	150	0.76～27 (37/37)	3.6	0.22～15 (37/37)	1.2
	[6-2] *p,p'*-DDE	120～5,800 (7/7)	820	320～53,000 (17/17)	2,300	7,500～160,000 (2/2)	45,000	0.98～96 (37/37)	4.8	0.89～22 (37/37)	2.2
	[6-3] *p,p'*-DDD	6～1,300 (7/7)	230	33～4,100 (17/17)	440	35～1,100 (2/2)	240	0.037～1.1 (37/37)	0.17	0.036～0.31 (37/37)	0.091
	[6-4] *o,p'*-DDT	5～330 (7/7)	46	3～720 (17/17)	68	nd～16 (2/2)	3	0.33～18 (37/37)	2.3	0.32～6.5 (37/37)	0.80
	[6-5] *o,p'*-DDE	8～390 (7/7)	45	tr(1)～13,000 (17/17)	46	nd～3 (1/2)	nd	0.11～5.0 (37/37)	0.48	0.15～1.1 (37/37)	0.30
	[6-6] *o,p'*-DDD	5～1,100 (7/7)	110	nd～1,000 (16/17)	62	tr(2)～14 (2/2)	4	0.05～1.6 (37/37)	0.19	0.04～0.26 (37/37)	0.10
[7]	Chlordanes	280～13,000 (7/7)	1,900	200～15,000 (17/17)	1,900	510～4,200 (2/2)	1,500	6.6～2,500 (37/37)	230	5.1～640 (37/37)	65
	[7-1] *cis*-Chlordane	85～11,000 (7/7)	660	36～3,500 (17/17)	410	tr(3)～280 (2/2)	26	1.9～790 (37/37)	75	1.5～200 (37/37)	21
	[7-2] *trans*-Chlordane	52～1,300 (7/7)	300	14～1,300 (17/17)	120	nd～27 (2/2)	tr(6)	2.5～990 (37/37)	87	1.8～250 (37/37)	25
	[7-3] Oxychlordane	7～1,100 (7/7)	54	15～2,200 (17/17)	120	290～960 (2/2)	530	0.50～7.1 (37/37)	1.7	0.27～1.8 (37/37)	0.61
	[7-4] *cis*-Nonachlor	33～780 (7/7)	180	46～3,200 (17/17)	330	37～410 (2/2)	130	0.18～87 (37/37)	7.9	0.16～19 (37/37)	2.0
	[7-5] *trans*-Nonachlor	94～2,000 (7/7)	440	87～6,900 (17/17)	820	180～2,600 (2/2)	680	1.5～650 (37/37)	59	1.3～170 (37/37)	17
[8]	Heptachlors	tr(8)～540 (7/7)	35	nd～350 (17/17)	37	180～560 (2/2)	350	1.6～200 (37/37)	24	0.96～63 (37/37)	8.8
	[8-1] Heptachlor	nd～9 (5/7)	tr(2)	nd～9 (7/17)	nd	nd (0/2)	nd	0.92～190 (37/37)	20	0.51～60 (37/37)	7.5
	[8-2] *cis*-Heptachlor epoxide	8～510 (7/7)	31	tr(3)～350 (17/17)	38	180～560 (2/2)	350	0.53～9.9 (37/37)	2.4	0.37～3.0 (37/37)	0.91
	[8-3] *trans*-Heptachlor epoxide	nd～33 (1/7)	nd	nd (0/17)	nd	nd (0/2)	nd	nd～0.17 (6/37)	nd	nd (0/37)	nd
[9]	Toxaphenes										
	[9-1] Parlar-26	nd～22 (7/7)	tr(8)	nd～730 (17/17)	30	nd～1,200 (2/2)	40	tr(0.12)～0.58 (37/37)	tr(0.21)	nd～tr(0.20) (36/37)	tr(0.11)
	[9-2] Parlar-50	nd～23 (6/7)	tr(7)	nd～1,000 (17/17)	38	nd～1,600 (1/2)	49	nd～tr(0.19) (15/37)	nd	nd (0/37)	nd
	[9-3] Parlar-62	nd (0/7)	nd	nd～590 (8/17)	tr(30)	nd～360 (1/2)	tr(70)	nd (0/37)	nd	nd (0/37)	nd
[10]	Mirex	tr(2)～18 (7/7)	4	tr(1)～48 (17/17)	11	27～260 (2/2)	72	0.03～0.25 (37/37)	0.09	0.03～0.08 (37/37)	0.05
[11]	HCHs										
	[11-1] *α*-HCH	7～380 (7/7)	18	nd～410 (17/17)	35	32～61 (2/2)	48	25～1,700 (37/37)	180	10～890 (37/37)	66
	[11-2] *β*-HCH	23～1,100 (7/7)	51	tr(4)～750 (17/17)	90	1,300～5,600 (2/2)	2,200	0.88～73 (37/37)	7.3	0.46～37 (37/37)	2.2
	[11-3] *γ*-HCH (synonym:Lindane)	tr(3)～98 (7/7)	9	nd～96 (15/17)	13	tr(5)～19 (2/2)	12	5.4～540 (37/37)	54	2.7～230 (37/37)	20
	[11-4] *δ*-HCH	nd～610 (3/7)	nd	nd～77 (12/17)	tr(4)	tr(3)～31 (2/2)	8	0.25～57 (37/37)	2.4	0.11～31 (37/37)	0.61

(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 3-4-5 List of the detection ranges in the Environmental Monitoring in FY 2008 (Part 5)

No	Target chemicals	Wildlife (pg/g-wet)						Air (pg/m^3)			
		Bivalves		Fish		Birds		First (Warm season)		Second (Cold season)	
		Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.
[12]	Chlordecone	nd (0/7)	nd	nd (0/17)	nd	nd (0/2)	nd				
[13]	Polybromodiphenyl ethers(Br_4～Br_{10})	nd～540 (5/7)	tr(130)	nd～2,000 (14/17)	tr(230)	tr(310)～2,100 (2/2)	630				
	[13-1] Tetrabromodiphenyl ethers	20～380 (7/7)	58	9.8～1,300 (17/17)	110	32～1,200 (2/2)	150				
	[13-2] Pentabromodiphenyl ethers	tr(11)～94 (7/7)	28	nd～280 (16/17)	30	52～440 (2/2)	140				
	[13-3] Hexabromodiphenyl ethers	tr(5.3)～82 (7/7)	18	nd～310 (17/17)	44	62～380 (2/2)	130				
	[13-4] Heptabromo diphenyl ethers	nd～35 (7/7)	tr(8.5)	nd～77 (10/17)	tr(11)	19～53 (2/2)	34				
	[13-5] Octabromodiphenyl ethers	nd～10 (6/7)	nd	nd～73 (7/17)	tr(5.5)	30～64 (2/2)	41				
	[13-6] Nonabromodiphenyl ethers	nd～tr(23) (1/7)	nd	nd～tr(15) (2/17)	nd	nd～tr(33) (2/2)	tr(20)				
	[13-7] Decabromodiphenyl ether	nd～tr(170) (3/7)	nd	nd～230 (4/16)	nd	nd～tr(110) (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.

Table 3-4-6 List of the detection ranges in the Environmental Monitoring in FY 2008 (Part 6)

No	Target chemicals	Wildlife (ng/g-wet)						Air (ng/m^3)			
		Bivalves		Fish		Birds		First (Warm season)		Second (Cold season)	
		Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.	Range (Frequency)	Av.
[14]	2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym:Atrazine)										
[15]	Dioctyltin compounds	nd～0.60 (4/7)	nd	nd～110 (3/17)	nd	nd (0/2)	nd				
[16]	*N*,*N'*-Diphenyl-*p*-phenylenediamines										
	[16-1] *N*,*N'*-Diphenyl-*p*-phenylenediamine										
	[16-2] *N*,*N'*-Ditolyl-*p*-phenylenediamine										
	[16-3] *N*,*N'*-Dixylyl-*p*-phenylenediamine										
[17]	2,6-Di-*tert*-butyl-4-methyl phenol (synonym:BHT)	nd～1.8 (6/7)	tr(0.53)	nd～26 (14/17)	tr(0.75)	nd～2.5 (1/2)	tr(0.74)	nd～230 (33/34)	6.6	nd～1,000 (32/37)	tr(3.6)
[18]	Dibenzothiophene	nd～1.3 (6/7)	nd	nd～0.86 (11/17)	tr(0.098)	nd (0/2)	nd				
[19]	2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym:Kelthane or Dicofol)	nd～0.21 (7/7)	tr(0.10)	nd～0.27 (14/17)	tr(0.059)	nd～0.30 (1/2)	nd				
[20]	2,4,6-Tri-*tert*-butylphenol	nd (0/7)	nd	nd (0/17)	nd	nd (0/2)	nd	nd (0/33)	nd	nd～1.7 (1/34)	nd
[21]	Di-*n*-butyl phthalate	nd～100 (2/7)	nd	nd～180 (12/17)	nd	nd (0/2)	nd				
[22]	Polychlorinated naphthalenes	tr(0.011)～1.3 (7/7)	0.077	nd～2.2 (17/17)	0.055	nd～tr(0.022) (1/2)	nd	0.035～0.66 (22/22)	0.20	0.015～0.91 (36/36)	0.13
[23]	Tri-*n*-butyl phosphate	nd～1.2 (6/7)	tr(0.46)	nd～tr(0.70) (3/16)	nd	nd～tr(0.63) (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.

Table 3-5-1 List of the quantification [detection] limits in the Environmental Monitoring in FY 2008 (Part 1)

No	Target chemicals	Surface water (pg/L)	Sediment (pg/g-dry)	Wildlife (pg/g-wet)	Air (pg/m^3)
[1]	Polychlorinated biphenyls (PCBs)	※7.8 [※3.0]	※3.3 [※1.2]	※47 [※17]	※0.8 [※0.3]
[2]	HCB	3 [1]	2.0 [0.8]	7 [3]	0.22 [0.08]
[3]	Aldrin	1.4 [0.6]	3 [1]	5 [2]	0.04 [0.02]
[4]	Dieldrin	1.5 [0.6]	1.2 [0.5]	9 [3]	0.24 [0.09]
[5]	Endrin	3 [1]	1.9 [0.7]	8 [3]	0.10 [0.04]
[6]	DDTs	※5.8 [※2.2]	※7.1 [※2.9]	※21 [※8]	※0.23 [※0.09]
	[6-1] *p,p'*-DDT	1.2 [0.5]	1.2 [0.5]	5 [2]	0.07 [0.03]
	[6-2] *p,p'*-DDE	1.1 [0.4]	1.7 [0.7]	3 [1]	0.04 [0.02]
	[6-3] *p,p'*-DDD	0.6 [0.2]	1.0 [0.4]	3 [1]	0.025 [0.009]
	[6-4] *o,p'*-DDT	1.4 [0.5]	1.5 [0.6]	3 [1]	0.03 [0.01]
	[6-5] *o,p'*-DDE	0.7 [0.3]	1.4 [0.6]	3 [1]	0.025 [0.009]
	[6-6] *o,p'*-DDD	0.8 [0.3]	0.3 [0.1]	4 [2]	0.04 [0.01]
[7]	Chlordanes	※9 [※3]	※10 [※4]	※29 [※10]	※0.47 [※0.16]
	[7-1] *cis*-Chlordane	1.6 [0.6]	2.4 [0.9]	5 [2]	0.14 [0.05]
	[7-2] *trans*-Chlordane	3 [1]	2.0 [0.8]	7 [3]	0.17 [0.06]
	[7-3] Oxychlordane	1.9 [0.7]	3 [1]	7 [2]	0.04 [0.01]
	[7-4] *cis*-Nonachlor	0.9 [0.3]	0.6 [0.2]	4 [1]	0.03 [0.01]
	[7-5] *trans*-Nonachlor	1.6 [0.6]	2.2 [0.8]	6 [2]	0.09 [0.03]
[8]	Heptachlors	※4.6 [※1.7]	※8 [※3]	※21 [※8]	※0.24 [※0.09]
	[8-1] Heptachlor	2.1 [0.8]	4 [1]	6 [2]	0.06 [0.02]
	[8-2] *cis*-Heptachlor epoxide	0.6 [0.2]	2 [1]	5 [2]	0.022 [0.008]
	[8-3] *trans*-Heptachlor epoxide	1.9 [0.7]	1.7 [0.7]	10 [4]	0.16 [0.06]
[9]	Toxaphenes				
	[9-1] Parlar-26	8 [3]	12 [5]	9 [3]	0.22 [0.08]
	[9-2] Parlar-50	7 [3]	17 [6]	10 [4]	0.25 [0.09]
	[9-3] Parlar-62	40 [20]	90 [40]	80 [30]	1.6 [0.6]
[10]	Mirex	0.6 [0.2]	0.7 [0.3]	4 [1]	0.03 [0.01]
[11]	HCHs				
	[11-1] α-HCH	4 [2]	1.6 [0.6]	6 [2]	0.10 [0.04]
	[11-2] β-HCH	1.0 [0.4]	0.8 [0.3]	6 [2]	0.04 [0.01]
	[11-3] γ-HCH (synonym:Lindane)	3 [1]	0.9 [0.4]	9 [3]	0.07 [0.03]
	[11-4] δ-HCH	2.3 [0.9]	2 [1]	6 [2]	0.04 [0.02]

(Note 1) Each quantification limit is shown above the corresponding [detection limit].

(Note 2) The quantification [detection] limit of polychlorinated biphenyls (PCBs) is the sum value of congeners (Cl1～Cl10).

(Note 3) The same quantification [detection] limit was employed for bivalves, fish and birds as wildlife for each target chemical.

(Note 4) The quantification [detection] limit for surface water offshore of Himeji was different from the value shown in the table.

Table 3-5-1 List of the quantification [detection] limits in the Environmental Monitoring in FY 2008 (Part 2)

No	Target chemicals	Surface water (pg/L)	Sediment (pg/g-dry)	Wildlife (pg/g-wet)	Air (pg/m^3)
[12]	Chlordecone	0.14 [0.05]	0.42 [0.16]	5.6 [2.2]	
[13]	Polybromodiphenyl ethers(Br_4～Br_{10})			※320 [※110]	
	[13-1] Tetrabromodiphenyl ethers			5.9 [2.2]	
	[13-2] Pentabromodiphenyl ethers			16 [5.9]	
	[13-3] Hexabromodiphenyl ethers			14 [5.0]	
	[13-4] Heptabromo diphenyl ethers			18 [6.7]	
	[13-5] Octabromodiphenyl ethers			9.6 [3.6]	
	[13-6] Nonabromodiphenyl ethers			35 [13]	
	[13-7] Decabromodiphenyl ether			220 [74]	

(Note 1) Each quantification limit is shown above the corresponding [detection limit].
(Note 2) The quantification [detection] limit of polychlorinated biphenyls (PCBs) is the sum value of congeners (Cl1～Cl10).
(Note 3) The same quantification [detection] limit was employed for bivalves, fish and birds as wildlife for each target chemical.
(Note 4) ▒ means the medium was not monitored.

Table 3-5-3 List of the quantification [detection] limits in the Environmental Monitoring in FY 2008 (Part 3)

No	Target chemicals	Surface water (ng/L)	Sediment (ng/g-dry)	Wildlife (ng/g-wet)	Air (ng/m^3)
[14]	2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-tria zine (synonym:Atrazine)	0.74 [0.29]	0.34 [0.13]		
[15]	Dioctyltin compounds	1.5 [0.6]	0.27 [0.09]	0.26 [0.10]	
[16]	*N*,*N'*-Diphenyl-*p*-phenyle nediamines				
	[16-1] *N*,*N'*-Diphenyl-*p*-phenylenediamine	4.4 [1.7]			
	[16-2] *N*,*N'*-Ditolyl-*p*-phenylenediamine	5.1 [2.0]			
	[16-3] *N*,*N'*-Dixylyl-*p*-phenylenediamine	5.4 [2.1]			
[17]	2,6-Di-*tert*-butyl-4-methyl phenol (synonym:BHT)	3.2 [1.1]	5.1 [1.7]	1.5 [0.50]	4.6 [1.5]
[18]	Dibenzothiophene	1.4 [0.55]	0.39 [0.15]	0.21 [0.082]	
[19]	2,2,2-Trichloro-1,1-bis(4-c hlorophenyl)ethanol (synonym:Kelthane or Dicofol)	0.025 [0.010]	0.16 [0.063]	0.12 [0.048]	
[20]	2,4,6-Tri-*tert*-butylphenol	41 [16]	4.4 [1.7]	3.7 [1.4]	0.56 [0.22]
[21]	Di-*n*-butyl phthalate	190 [69]	130 [44]	84 [30]	
[22]	Polychlorinated naphthalenes	※0.085 [※0.030]	※0.084 [※0.030]	※0.026 [※0.010]	※0.0040 [※0.0013]
[23]	Tri-*n*-butyl phosphate	24 [7.9]	2.2 [0.73]	1.2 [0.40]	

(Note 1) Each quantification limit is shown above the corresponding [detection limit].
(Note 2) The quantification [detection] limit of polychlorinated biphenyls (PCBs) is the sum value of congeners (Cl1～Cl10).
(Note 3) The same quantification [detection] limit was employed for bivalves, fish and birds as wildlife for each target chemical.
(Note 4) ▒ means the medium was not monitored.

Table 3-6-1 Results of inter-annual trend analysis from FY2002 to FY2008 (surface water)

No	Name	Surface water	River area	Lake area	River mouth area	Sea area
[1]	Polychlorinated biphenyls (PCBs)	↘	—	↘	—	↘
[2]	HCB	•	↘*	—	↘*	↘
[3]	Aldrin	more than half are nd	more than half are nd	more than half are nd	more than half are nd	•
[4]	Dieldrin	—	—	—	—	—
[5]	Endrin	↘	—	—	—	—
[6]	DDTs					
	[6-1] *p,p'*-DDT	—	—	—	—	—
	[6-2] *p,p'*-DDE	—	—	—	—	—
	[6-3] *p,p'*-DDD	—	—	—	—	—
	[6-4] *o,p'*-DDT	↘	—	↘	—	↘
	[6-5] *o,p'*-DDE	•	more than half are nd	—	•	↘
	[6-6] *o,p'*-DDD	•	—	—	—	—
[7]	Chlordanes					
	[7-1] *cis*- Chlordane	↘	—	↘	—	—
	[7-2] *trans*- Chlordanes	↘	—	↘	—	↘
	[7-3] Oxychlordane	•	—	more than half are nd	↘	more than half are nd
	[7-4] *cis*- Nonachlor	—	—	↘	—	—
	[7-5] *trans*- Nonachlor	↘	—	↘	—	↘
[8]	Heptachlors					
	[8-1] Heptachlor	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
	[8-2] *cis*-Heptachlor epoxide	↘	—	↘	—	—
	[8-3] *trans*-Heptachlor epoxide	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
[9]	Toxaphenes					
	[9-1] Parlar-26	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
	[9-2] Parlar-50	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
	[9-3] Parlar-62	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
[10]	Mirex	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
[11]	HCHs					
	[11-1] α-HCH	•	—	—	—	—
	[11-2] β-HCH	—	—	↘	—	—
	[11-3] γ-HCH (synonym:Lindane)	•	•	•	•	•
	[11-4] δ-HCH	more than half are nd	•	•	•	more than half are nd

(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.

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

"more than half are nd ": The inter-annual trend analysis was not performed because measured concentrations of more than 50% of samples did not reach the detection limit(nd) in a FYor more.

"・": The inter-annual trend analysis was not performed because measured concentrations did not show a normal distribution in a FY or more.

" * " : The inter-annual trend was analyzed by results which was excluded one time of loser value, and " ** " : The inter-annual trend was analyzed by results which was excluded two times of loser values.

(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 FY2008 (sediment)

No	Name	Sediment				
			River area	Lake area	River mouth area	Sea area
[1]	Polychlorinated biphenyls (PCBs)	—	—	—	—	—
[2]	HCB	—	•	—	—	—**
[3]	Aldrin	•	more than half are nd	more than half are nd	↘	↘
[4]	Dieldrin	↘	—	—	•	—
[5]	Endrin	•	•	—	—	—*
[6]	DDTs					
	[6-1] *p,p'*-DDT	↘	—	—	—	—
	[6-2] *p,p'*-DDE	—	—	—	—	—
	[6-3] *p,p'*-DDD	—	—	—	•	—
	[6-4] *o,p'*-DDT	↘	—	—	—	•
	[6-5] *o,p'*-DDE	—	—	—	—	—
	[6-6] *o,p'*-DDD	—	—	—	—	—
[7]	Chlordanes					
	[7-1] *cis*- Chlordane	•	—	—	•	↘*
	[7-2] *trans*- Chlordanes	•	—	—	•	↘
	[7-3] Oxychlordane	•	—	•	—	more than half are nd
	[7-4] *cis*- Nonachlor	—	—	—	•	—
	[7-5] *trans*- Nonachlor	•	—	—	•	—
[8]	Heptachlors					
	[8-1] Heptachlor	more than half are nd	more than half are nd	more than half are nd	•	more than half are nd
	[8-2] *cis*-Heptachlor epoxide	•	•	•	•	•
	[8-3] *trans*-Heptachlor epoxide	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
[9]	Toxaphenes					
	[9-1] Parlar-26	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
	[9-2] Parlar-50	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
	[9-3] Parlar-62	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
[10]	Mirex	•	more than half are nd	more than half are nd	•	•
[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.
"—": An inter-annual trend was not found.
"more than half are nd ": The inter-annual trend analysis was not performed because measured concentrations of more than 50% of samples did not reach the detection limit(nd) in a FYor more.
"・": The inter-annual trend analysis was not performed because measured concentrations did not show a normal distribution in a FY or more.
" * " : The inter-annual trend was analyzed by results which was excluded one time of loser value, and " ** " : The inter-annual trend was analyzed by results which was excluded two times of loser values.
(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 FY2008 (wildlife)

No	Name	Bivalves	Fish	Birds	Black-taild gull	Gray starling
[1]	Polychlorinated biphenyls (PCBs)	—	—	—	—	↘
[2]	HCB	•	•	—	—	↘
[3]	Aldrin	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
[4]	Dieldrin	•	—	↘	—	↘
[5]	Endrin	•	•	—	↘	more than half are nd
[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	—	•	↘	↘	more than half are nd
	[6-6] *o,p'*-DDD	—	—	↘	↘	↘
[7]	Chlordanes					
	[7-1] *cis*- Chlordane	—	—	—	↘	↘
	[7-2] *trans*- Chlordanes	—	•	↘	—	more than half are nd
	[7-3] Oxychlordane	—	—	↘	—	↘
	[7-4] *cis*- Nonachlor	—	—	—	↘	↘
	[7-5] *trans*- Nonachlor	—	—	—	↘	↘
[8]	Heptachlors					
	[8-1] Heptachlor	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
	[8-2] *cis*-Heptachlor epoxide	•	—	•	—	—
	[8-3] *trans*-Heptachlor epoxide	more than half are nd	more than half are nd	more than half are nd	more than half are nd	more than half are nd
[9]	Toxaphenes					
	[9-1] Parlar-26	more than half are nd	•	•	↘	more than half are nd
	[9-2] Parlar-50	more than half are nd	•	•	↘	more than half are nd
	[9-3] Parlar-62	more than half are nd	more than half are nd	•	—	more than half are nd
[10]	Mirex	•	•	•	—	↘
[11]	HCHs					
	[11-1] *α*-HCH	↘	—	↘	↘	↘
	[11-2] *β*-HCH	—*	•	—	—	↘
	[11-3] *γ*-HCH (synonym:Lindane)	•	•	•	—	—
	[11-4] *δ*-HCH	more than half are nd	•	•	—	↘

(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.

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

"more than half are nd ": The inter-annual trend analysis was not performed because measured concentrations of more than 50% of samples did not reach the detection limit(nd) in a FYor more.

"・": The inter-annual trend analysis was not performed because measured concentrations did not show a normal distribution in a FY or more.

" * " : The inter-annual trend was analyzed by results which was excluded one time of loser value, and " ** " : The inter-annual trend was analyzed by results which was excluded two times of loser values.

Table 3-6-4 Results of inter-annual trend analysis from FY2002 to FY2008 (air)

No	Name	Air	
		Warm season	Cold season
[1]	Polychlorinated biphenyls (PCBs)	—	—
[2]	HCB	↘	—
[3]	Aldrin	•	more than half are nd
[4]	Dieldrin	—	—
[5]	Endrin	—	more than half are nd
[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*- Chlordanes	—	—
	[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	more than half are nd	more than half are nd
[9]	Toxaphenes		
	[9-1] Parlar-26	more than half are nd	more than half are nd
	[9-2] Parlar-50	more than half are nd	more than half are nd
	[9-3] Parlar-62	more than half are nd	more than half are nd
[10]	Mirex	—	•
[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.

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

"more than half are nd ": The inter-annual trend analysis was not performed because measured concentrations of more than 50% of samples did not reach the detection limit(nd) in a FYor more.

"・": The inter-annual trend analysis was not performed because measured concentrations did not show a normal distribution in a FY or more.

" * ": The inter-annual trend was analyzed by results which was excluded one time of loser value, and " ** " : The inter-annual trend was analyzed by results which was excluded two times of loser values.

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)	○	○
	Iwate Pref.	Riv. Toyosawa(Hanamaki City)	○	○
	Sendai City	Hirose-ohashi Bridge, Riv. Hirose(Sendai City)		○
	Ibaraki Pref.	Tonekamome-ohasi Bridge, Mouth of Riv. Tone(Kamisu City)	○	○
	Tochigi Pref.	Riv. Tagawa(Utsunomiya City)	○	○
	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 Bridge, Riv. Katsura(Kyoto City)	○	○
	Osaka City	Riv. Yodo(Osaka City)		○
	Nara Pref.	Riv. Yamato(Ooji Town)		○
	Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa (Wakayama 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	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City)	○	○
	Yamagata Pref.	Mouth of Riv. Mogami(Sakata City)	○	○
	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)	○	○
	Osaka Pref.	Mouth of Riv. Yamato(Sakai City)	○	○
	Osaka City	Osaka Port	○	○
		Mouth of Riv. Yodo(Osaka City)		○
	Tokushima Pref.	Mouth of Riv. Yoshino(Tokushima City)	○	○
	Kochi Pref.	Mouth of Riv. Shimanto(Shimanto City)	○	○
	Kumamoto Pref.	Riv. Midori(Uto City)	○	
	Oita Pref.	Mouth of Riv. Oita(Oita City)		○
	Miyazaki Pref.	Mouth of Riv. Oyodo(Miyazaki City)	○	○
Sea area	Hokkaido	Tomakomai Port		○
	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.	Kinuura Port		○
		Nagoya Port	○	○
	Mie Pref.	Yokkaichi Port	○	○
		Toba 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	○	○
	Kagawa Pref.	Takamatsu Port	○	○
	Ehime Pref.	Niihama Port		○
	Kitakyushu City	Dokai Bay	○	○
	Fukuoka City	Hakata Bay		○
	Saga Pref.	Imari Bay	○	○
	Nagasaki Pref.	Omura Bay	○	○
	Okinawa Pref.	Naha Port	○	○

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

(1) The Environmental Monitoring (POPs)

The high-sensitivity analysis of POPs and HCHs was conducted in FY 2008, following the monitoring in FY 2002, 2003, 2004, 2005, 2006 and 2007. Except for cases of trans-Heptachlor epoxide and Toxaphenes in surface water and sediment, toxaphenes (Parlar-62) and Chlordecone in wildlife (bivalves), heptachlors (*trans*-heptachlor epoxide) and Chlordecone in wildlife (fish), aldrin, heptachlors (heptachlor and *trans*-heptachlor epoxide) and Chlordecone in wildlife (birds), and toxaphenes (Parlar-62) in air, all chemicals were detected.

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

[1] PCBs

・ History and state of monitoring

Polychlorinated biphenyls (PCBs) 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 substances in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 3.0 pg/L, and the detection range was 27～4,300 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2008, 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.

Stocktaking of the detection of PCBs (total amount) in surface water during FY2002~2008

PCBs（total amount）	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Surface water (pg/L)	2002	460	330	11,000	60	※7.4 [2.5]	114/114	38/38
	2003	530	450	3,100	230	※9.4 [2.5]	36/36	36/36
	2004	630	540	4,400	140	※14 [5.0]	38/38	38/38
	2005	520	370	7,800	140	※10 [3.2]	47/47	47/47
	2006	240	200	4,300	15	※9 [3]	48/48	48/48
	2007	180	140	2,700	12	※7.6 [2.9]	48/48	48/48
	2008	260	250	4,300	27	※7.8 [3.0]	48/48	48/48

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

<Sediment>

The presence of the substances in sediment was monitored at 64 sites, and it was detected at all 64 valid sites adopting the detection limit of 1.2 pg/g-dry, and the detection range was 22～630,000 pg/g-dry.

Stocktaking of the detection of PCBs (total amount) in sediment during FY2002~2008

PCBs（total amount）	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	9,200	11,000	630,000	39	※10 [3.5]	189/189	63/63
	2003	8,200	9,500	5,600,000	39	※10 [3.2]	186/186	62/62
	2004	7,300	7,600	1,300,000	38	※7.9 [2.6]	189/189	63/63
	2005	7,500	7,100	690,000	42	※6.3 [2.1]	189/189	63/63
	2006	7,600	6,600	690,000	36	※4 [1]	192/192	64/64
	2007	6,100	6,800	820,000	19	※4.7 [1.5]	192/192	64/64
	2008	7,400	8,900	630,000	22	※3.3 [1.2]	192/192	64/64

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

<Wildlife>

The presence of the substances in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 17 pg/g-wet, and the detection range was 870～69,000 pg/g-wet. For fish, the presence of the substances was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 17 pg/g-wet, and the detection range was 1,200～330,000 pg/g-wet. For birds, the presence of the substances was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 17 pg/g-wet, and the detection range was 3,000～56,000 pg/g-wet. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from gray starlings was identified as statistically significant.

Stocktaking of the detection of PCBs (total amount) in wildlife (bivalves, fish and birds) during FY2002~2008

PCBs（total amount）	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	10,000	28,000	160,000	200	※25 [8.4]	38/38	8/8
	2003	11,000	9,600	130,000	1,000	※50 [17]	30/30	6/6
	2004	7,700	11,000	150,000	1,500	※85 [29]	31/31	7/7
	2005	8,200	13,000	85,000	920	※69 [23]	31/31	7/7
	2006	6,400	8,600	77,000	690	※42 [14]	31/31	7/7
	2007	6,900	11,000	66,000	980	※46 [18]	31/31	7/7
	2008	6,600	8,600	69,000	870	※47 [17]	31/31	7/7
Fish (pg/g-wet)	2002	14,000	8,100	550,000	1,500	※25 [8.4]	70/70	14/14
	2003	11,000	9,600	150,000	870	※50 [17]	70/70	14/14
	2004	15,000	10,000	540,000	990	※85 [29]	70/70	14/14
	2005	13,000	8,600	540,000	800	※69 [23]	80/80	16/16
	2006	12,000	9,000	310,000	990	※42 [14]	80/80	16/16
	2007	11,000	6,200	530,000	790	※46 [18]	80/80	16/16
	2008	11,000	9,100	330,000	1,200	※47 [17]	85/85	17/17
Birds (pg/g-wet)	2002	11,000	14,000	22,000	4,800	※25 [8.4]	10/10	2/2
	2003	18,000	22,000	42,000	6,800	※50 [17]	10/10	2/2
	2004	8,900	9,400	13,000	5,900	※85 [29]	10/10	2/2
	2005	10,000	9,700	19,000	5,600	※69 [23]	10/10	2/2
	2006	11,000	9,800	48,000	5,600	※42 [14]	10/10	2/2
	2007	7,500	7,800	15,000	3,900	※46 [18]	10/10	2/2
	2008	8,800	7,400	56,000	3,000	※47 [17]	10/10	2/2

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

<Air>

The presence of the substances in air in the warm season was monitored at 37 sites and, excluding 15 sites whose concentrations were treated as invalid, it was detected at all 22 valid sites adopting the detection limit of 0.3 pg/m^3, and the detection range was 52～960 pg/m^3. For air in the cold season, the presence of the substances was monitored at 37 sites and, excluding 1 site which concentration was treated as invalid, it was detected at all 36 valid sites adopting the detection limit of 0.3 pg/m^3, and the detection range was 21～1,500 pg/m^3.

The cause of the above-mentioned invalidity was the malfunction of measuring instruments used from FY 2007. After taking measure, the monitoring in cold season in FY 2008 was conducted except for 1 site.

Stocktaking of the detection of PCBs (total amount) in air during FY2002~2008

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

(Note 1) ※ indicates the sum value of the Quantification [Detection] limits of each congener.

(Note 2) In 2002, there was a technical problem in the measuring method for lowly chlorinated congeners, and therefore the values are shown just as reference.

[2] Hexachlorobenzene

・ History and state of monitoring

Hexachlorobenzene 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 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 1 pg/L, and the detection range was 4～480 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendencies in specimens from river area, river mouth area and sea area were identified as statistically significant.

Stocktaking of the detection of Hexachlorobenzene in surface water during FY2002~2008

Hexachlorobenzene	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	36	28	1,400	9.8	0.6 [0.2]	114/114	38/38
	2003	29	24	340	11	5 [2]	36/36	36/36
	2004	30	tr(29)	180	tr(11)	30 [8]	38/38	38/38
	2005	21	17	210	tr(6)	15 [5]	47/47	47/47
	2006	16	tr(12)	190	Nd	16 [5]	46/48	46/48
	2007	17	14	190	tr(4)	8 [3]	48/48	48/48
	2008	16	13	480	4	3 [1]	48/48	48/48

< 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 0.8 pg/g-dry, and the detection range was 4.4～29,000 pg/g-dry.

Stocktaking of the detection of Hexachlorobenzene in sediment during FY2002~2008

Hexachlorobenzene	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	210	200	19,000	7.6	0.9 [0.3]	189/189	63/63
	2003	140	120	42,000	5	4 [2]	186/186	62/62
	2004	130	100	25,000	tr(6)	7 [3]	189/189	63/63
	2005	160	130	22,000	13	3 [1]	189/189	63/63
	2006	170	120	19,000	10	2.9 [1.0]	192/192	64/64
	2007	120	110	65,000	nd	5 [2]	191/192	64/64
	2008	140	97	29,000	4.4	2.0 [0.8]	192/192	64/64

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 13～240 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 25～1,500 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 240～2,500 pg/g-wet. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency of the concentration in specimens from gray starlings was identified as statistically significant.

Stocktaking of the detection of Hexachlorobenzene in wildlife (bivalves, fish and birds) during FY2002~2008

Hexachlorobenzene	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Bivalves (pg/g-wet)	2002	23	22	330	2.4	0.18 [0.06]	38/38	8/8
	2003	44	27	660	tr(21)	23 [7.5]	30/30	6/6
	2004	30	31	80	14	14 [4.6]	31/31	7/7
	2005	38	28	450	19	11 [3.8]	31/31	7/7
	2006	35	28	340	11	3 [1]	31/31	7/7
	2007	27	22	400	11	7 [3]	31/31	7/7
	2008	30	24	240	13	7 [3]	31/31	7/7
Fish (pg/g-wet)	2002	140	180	910	19	0.18 [0.06]	70/70	14/14
	2003	170	170	1,500	28	23 [7.5]	70/70	14/14
	2004	220	210	1,800	26	14 [4.6]	70/70	14/14
	2005	170	160	1,700	29	11 [3.8]	80/80	16/16
	2006	170	220	1,400	25	3 [1]	80/80	16/16
	2007	150	140	1,500	17	7 [3]	80/80	16/16
	2008	160	210	1,500	25	7 [3]	85/85	17/17
Birds (pg/g-wet)	2002	1,000	1,200	1,600	560	0.18 [0.06]	10/10	2/2
	2003	1,700	2,000	4,700	790	23 [7.5]	10/10	2/2
	2004	970	1,300	2,200	410	14 [4.6]	10/10	2/2
	2005	980	1,100	2,500	400	11 [3.8]	10/10	2/2
	2006	960	1,100	2,100	490	3 [1]	10/10	2/2
	2007	940	1,100	2,000	420	7 [3]	10/10	2/2
	2008	850	1,100	2,500	240	7 [3]	10/10	2/2

<Air>

The presence of the substance in air in the warm season was monitored at 37 sites and, excluding 15 sites whose concentrations were treated as invalid, it was detected at all 22 valid sites adopting the detection limit of 0.08 pg/m^3, and the detection range was 78～260 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and, excluding 1 site which concentration was treated as invalid, it was detected at all 36 valid sites adopting the detection limit of 0.08 pg/m^3, and the detection range was 58～160 pg/m^3. As a result of the inter-annual trend analysis from FY 2003 to FY 2008, reduction tendency in specimens at the warm season was identified as statistically significant.

The cause of the above-mentioned invalidity was the malfunction of measuring instruments used from FY 2007. After taking measure, the monitoring in cold season in FY 2008 was conducted except for 1 site.

Stocktaking of the detection of Hexachlorobenzene in air during FY2002~2008

Hexachlorobenzene	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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

[3] Aldrin

・ History and state of monitoring

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

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.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 48 sites, and it was detected at 26 of the 48 valid sites adopting the detection limit of 0.6 pg/L, and none of the detected concentrations exceeded 21 pg/L.

Stocktaking of the detection of Aldrin in surface water during FY2002~2008

Aldrin	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	0.69	0.90	18	nd	0.6 [0.2]	93/114	37/38
	2003	0.9	0.9	3.8	nd	0.6 [0.2]	34/36	34/36
	2004	tr(1.5)	tr(1.8)	13	nd	2 [0.4]	33/38	33/38
	2005	tr(0.6)	tr(0.7)	5.7	nd	0.9 [0.3]	32/47	32/47
	2006	nd	nd	4.4	nd	1.7 [0.6]	18/48	18/48
	2007	tr(0.6)	tr(0.6)	9.5	nd	1.0 [0.3]	34/48	34/48
	2008	tr(0.8)	tr(0.7)	21	nd	1.4 [0.6]	26/48	26/48

<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 1 pg/g-dry, and none of the detected concentrations exceeded 370 pg/g-dry. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendencies in specimens from river mouth area and sea area were identified as statistically significant.

Stocktaking of the detection of Aldrin in sediment during FY2002~2008

Aldrin	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	12	12	570	nd	6 [2]	149/189	56/63
	2003	17	18	1,000	nd	2 [0.6]	178/186	60/62
	2004	9	10	390	nd	2 [0.6]	170/189	62/63
	2005	7.5	7.1	500	nd	1.4 [0.5]	173/189	62/63
	2006	9.1	9.3	330	nd	1.9 [0.6]	184/192	64/64
	2007	6.6	6.7	330	nd	1.8 [0.6]	172/192	60/64
	2008	5	6	370	nd	3 [1]	153/192	56/64

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 3 of the 7 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded 20 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in 1 of the 17 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded tr(2) pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and not detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet.

Stocktaking of the detection of Aldrin in wildlife (bivalves, fish and birds) during FY2002~2008

Aldrin	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	tr(1.7)	nd	34	nd	4.2 [1.4]	12/38	4/8
	2003	tr(1.6)	tr(0.85)	51	nd	2.5 [0.84]	15/30	3/6
	2004	tr(1.7)	tr(1.6)	46	nd	4 [1.3]	16/31	4/7
	2005	nd	nd	84	nd	3.5 [1.2]	11/31	3/7
	2006	nd	nd	19	nd	4 [2]	11/31	3/7
	2007	nd	nd	26	nd	5 [2]	5/31	2/7
	2008	nd	nd	20	nd	5 [2]	5/31	3/7
Fish (pg/g-wet)	2002	nd	nd	tr(2.0)	nd	4.2 [1.4]	1/70	1/14
	2003	nd	nd	tr(1.9)	nd	2.5 [0.84]	16/70	7/14
	2004	nd	nd	tr(2.4)	nd	4 [1.3]	5/70	2/14
	2005	nd	nd	6.4	nd	3.5 [1.2]	11/80	5/16
	2006	nd	nd	tr(2)	nd	4 [2]	2/80	2/16
	2007	nd	nd	tr(2)	nd	5 [2]	2/80	2/16
	2008	nd	nd	tr(2)	nd	5 [2]	1/85	1/17
Birds (pg/g-wet)	2002	nd	nd	nd	nd	4.2 [1.4]	0/10	0/2
	2003	nd	nd	nd	nd	2.5 [0.84]	0/10	0/2
	2004	nd	nd	nd	nd	4 [1.3]	0/10	0/2
	2005	nd	nd	nd	nd	3.5 [1.2]	0/10	0/2
	2006	nd	nd	nd	nd	4 [2]	0/10	0/2
	2007	nd	nd	nd	nd	5 [2]	0/10	0/2
	2008	nd	nd	nd	nd	5 [2]	0/10	0/2

<Air>

The presence of the substance in air in the warm season was monitored at 37 sites and, excluding 12 sites whose concentrations were treated as invalid, it was detected at all 25 valid sites adopting the detection limit of 0.02 pg/m^3, and the detection range was tr(0.02)～9.4 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and, excluding 12 sites whose concentrations were treated as invalid, it was detected at 22 of 25 valid sites adopting the detection limit of 0.02 pg/m^3, and none of the detected concentrations exceeded 1.3 pg/m^3.

In addition, it has also been noted that there were some problems on collection of Alderin because of the low recovery rate of stable isotope ($^{13}C_{12}$-Aldrin) added in order to identify the recovery rate during air sampling. Therefore, samples whose recovery rate was 50 % were recognized as undetectable in calculation of FY 2008.

Stocktaking of the detection of Aldrin in air during FY2002~2008

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

[4] Dieldrin

・ History and state of monitoring

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

・ Monitoring results

< Surface Water>

The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.6 pg/L, and the detection range was 3.6～450 pg/L.

Stocktaking of the detection of Dieldrin in surface water during FY2002~2008

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

< 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 0.5 pg/g-dry, and the detection range was tr(0.7)～2,900 pg/g-dry. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from overall areas identified as statistically significant.

Stocktaking of the detection of Dieldrin in sediment during FY2002~2008

Dieldrin	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	63	51	2,300	4	3 [1]	189/189	63/63
	2003	59	56	9,100	nd	4 [2]	184/186	62/62
	2004	58	62	3,700	tr(1.9)	3 [0.9]	189/189	63/63
	2005	56	55	4,200	tr(2)	3 [1]	189/189	63/63
	2006	54	54	1,500	tr(1.7)	2.9 [1.0]	192/192	64/64
	2007	42	40	2,700	tr(1.2)	2.7 [0.9]	192/192	64/64
	2008	42	43	2,900	tr(0.7)	1.2 [0.5]	192/192	64/64

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 47～24,000 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 15～1,300 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 260～1,300 pg/g-wet. It was concluded that the concentration trend of decrease from 2002 to 2008 was statistically significant in gray starlings and was also significant in birds including.

As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from black-taild gulls was identified as statistically significant, and reduction tendency in specimens from the overall birds including black-taild gulls was also identified as statistically significant.

Stocktaking of the detection of Dieldrin in wildlife (bivalves, fish and birds) during FY2002~2008

Dieldrin	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	490	390	190,000	tr(7)	12 [4]	38/38	8/8
	2003	410	160	78,000	46	4.8 [1.6]	30/30	6/6
	2004	510	270	69,000	42	31 [10]	31/31	7/7
	2005	320	140	39,000	34	9.4 [3.4]	31/31	7/7
	2006	340	120	47,000	30	7 [3]	31/31	7/7
	2007	300	110	77,000	37	9 [3]	31/31	7/7
	2008	310	150	24,000	47	9 [3]	31/31	7/7
Fish (pg/g-wet)	2002	280	270	2,400	46	12 [4]	70/70	14/14
	2003	210	200	1,000	29	4.8 [1.6]	70/70	14/14
	2004	240	230	2,800	tr(23)	31 [10]	70/70	14/14
	2005	220	250	1,400	21	9.4 [3.4]	80/80	16/16
	2006	220	220	1,400	19	7 [3]	80/80	16/16
	2007	240	210	1,900	23	9 [3]	80/80	16/16
	2008	230	240	1,300	15	9 [3]	85/85	17/17
Birds (pg/g-wet)	2002	1,200	1,100	1,700	820	12 [4]	10/10	2/2
	2003	1,300	1,400	2,200	790	4.8 [1.6]	10/10	2/2
	2004	590	610	960	370	31 [10]	10/10	2/2
	2005	810	740	1,800	500	9.4 [3.4]	10/10	2/2
	2006	700	690	1,300	440	7 [3]	10/10	2/2
	2007	710	710	910	560	9 [3]	10/10	2/2
	2008	620	620	1,300	260	9 [3]	10/10	2/2

<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 0.09 pg/m^3, and the detection range was 1.6～220 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.09 pg/m^3, and the detection range was 0.68～72 pg/m^3.

Stocktaking of the detection of Dieldrin in air during FY2002~2008

Dieldrin	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	5.6	5.4	110	0.73	0.60 [0.20]	102/102	34/34
	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

[5] Endrin

・ History and state of monitoring

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

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.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 48 sites, and it was detected at 45 of the 48 valid sites adopting the detection limit of 1 pg/L, and none of the detected concentrations exceeded 20 pg/L. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens the overall areas was identified as statistically significant.

Stocktaking of the detection of Endrin in surface water during FY2002~2008

Endrin	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	tr(4.7)	tr(5.5)	31	nd	6.0 [2.0]	101/114	36/38
	2003	5.7	6.0	78	0.7	0.7 [0.3]	36/36	36/36
	2004	7	7	100	tr(0.7)	2 [0.5]	38/38	38/38
	2005	4.0	4.5	120	nd	1.1 [0.4]	45/47	45/47
	2006	3.1	3.5	26	nd	1.3 [0.4]	44/48	44/48
	2007	3.5	3.4	25	nd	1.9 [0.6]	46/48	46/48
	2008	3	4	20	nd	3 [1]	45/48	45/48

<Sediment>

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 61 of the 64 valid sites adopting the detection limit of 0.7 pg/g-dry, and none of the detected concentrations exceeded 38,000 pg/g-dry.

Stocktaking of the detection of Endrin in sediment during FY2002~2008

Endrin	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	9	10	19,000	nd	6 [2]	141/189	54/63
	2003	11	11	29,000	nd	5 [2]	150/186	53/62
	2004	13	13	6,900	nd	3 [0.9]	182/189	63/63
	2005	10	11	19,000	nd	2.6 [0.9]	170/189	61/63
	2006	11	10	61,000	nd	4 [1]	178/192	63/64
	2007	9	9	61,000	nd	5 [2]	151/192	55/64
	2008	8.7	11	38,000	nd	1.9 [0.7]	168/192	61/64

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was tr(6)～1,500 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in 14 of the 17 valid areas adopting the detection limit of 3 pg/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 detected in 1 of the 2 valid areas adopting the detection limit of 3 pg/g-wet, and none of the detected concentrations exceeded 83 pg/g-wet. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from black-taild gulls was identified as statistically significant.

Stocktaking of the detection of Endrin in wildlife (bivalves, fish and birds) during FY2002~2008

Endrin	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	44	27	12,000	nd	18 [6]	35/38	7/8
	2003	36	21	5,000	6.3	4.8 [1.6]	30/30	6/6
	2004	54	25	4,600	tr(5.7)	12 [4.2]	31/31	7/7
	2005	30	19	2,100	nd	17 [5.5]	27/31	7/7
	2006	37	15	3,100	tr(5)	11 [4]	31/31	7/7
	2007	26	12	3,000	tr(6)	9 [3]	31/31	7/7
	2008	26	10	1,500	tr(6)	8 [3]	31/31	7/7
Fish (pg/g-wet)	2002	19	24	180	nd	18 [6]	54/70	13/14
	2003	14	10	180	nd	4.8 [1.6]	67/70	14/14
	2004	18	24	220	nd	12 [4.2]	57/70	13/14
	2005	tr(16)	tr(16)	2,100	nd	17 [5.5]	58/80	12/16
	2006	13	tr(10)	150	12	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
Birds (pg/g-wet)	2002	22	52	99	nd	18 [6]	7/10	2/2
	2003	21	30	96	5.4	4.8 [1.6]	10/10	2/2
	2004	tr(11)	25	62	nd	12 [4.2]	5/10	1/2
	2005	tr(16)	28	64	nd	17 [5.5]	7/10	2/2
	2006	15	23	57	tr(4)	11 [4]	10/10	2/2
	2007	15	28	55	nd	9 [3]	9/10	2/2
	2008	10	26	83	nd	8 [3]	5/10	1/2

<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 0.04 pg/m^3, and the detection range was tr(0.06)～4.6 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at 35 of the 37 valid sites adopting the detection limit of 0.04 pg/m^3, and none of the detected concentrations exceeded 1.8 pg/m^3.

Stocktaking of the detection of Endrin in air during FY2002~2008

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

[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 48 sites, and it was detected at 47 of the 48 valid sites adopting the detection limit of 0.5 pg/L, and none of the detected concentrations exceeded 1,200 pg/L.

p,p'-DDE: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.4 pg/L, and the detection range was 2.5～350 pg/L.

p,p'-DDD: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.2 pg/L, and the detection range was 2.0～850 pg/L.

Stocktaking of the detection of *p,p'*-DDT, *p,p'*-DDE and *p,p'*-DDD in surface water during FY2002~2008

p,p'-DDT	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Surface water (pg/L)	2002	12	11	440	tr(0.25)	0.6 [0.2]	114/114	38/38
	2003	14	12	740	tr(2.8)	3 [0.9]	36/36	36/36
	2004	15	14	310	nd	6 [2]	36/38	36/38
	2005	8	9	110	1	4 [1]	47/47	47/47
	2006	9.1	9.2	170	tr(1.6)	1.9 [0.6]	48/48	48/48
	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

p,p'-DDE	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Surface water (pg/L)	2002	24	26	760	1.3	0.6 [0.2]	114/114	38/38
	2003	26	22	380	5	4 [2]	36/36	36/36
	2004	36	34	680	tr(6)	8 [3]	38/38	38/38
	2005	26	24	410	4	6 [2]	47/47	47/47
	2006	24	24	170	tr(4)	7 [2]	48/48	48/48
	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

p,p′-DDD	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	15	18	190	0.57	0.24 [0.08]	114/114	38/38
	2003	19	18	410	4	2 [0.5]	36/36	36/36
	2004	19	18	740	tr(2.4)	3 [0.8]	38/38	38/38
	2005	17	16	130	tr(1.8)	1.9 [0.64]	47/47	47/47
	2006	16	17	99	2.0	1.6 [0.5]	48/48	48/48
	2007	15	12	150	tr(1.5)	1.7 [0.6]	48/48	48/48
	2008	22	20	850	2.0	0.6 [0.2]	48/48	48/48

<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 0.5 pg/g-dry, and the detection range was 4.8～1,400,000 pg/g-dry. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from overall areas was identified as statistically significant.

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 0.7 pg/g-dry, and the detection range was 9.0～96,000 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 0.4 pg/g-dry, and the detection range was 2.8～300,000 pg/g-dry.

Stocktaking of the detection of *p,p′*-DDT, *p,p′*-DDE and *p,p′*-DDD in sediment during FY2002~2008

p,p′-DDT	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	270	240	97,000	tr(5)	6 [2]	189/189	63/63
	2003	240	220	55,000	3	2 [0.4]	186/186	62/62
	2004	330	230	98,000	7	2 [0.5]	189/189	63/63
	2005	280	230	1,700,000	5.1	1.0 [0.34]	189/189	63/63
	2006	260	240	130,000	4.5	1.4 [0.5]	192/192	64/64
	2007	170	150	130,000	3	1.3 [0.5]	192/192	64/64
	2008	210	180	1,400,000	4.8	1.2 [0.5]	192/192	64/64

p,p′-DDE	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	660	630	23,000	8.4	2.7 [0.9]	189/189	63/63
	2003	710	780	80,000	9.5	0.9 [0.3]	186/186	62/62
	2004	630	700	39,000	8	3 [0.8]	189/189	63/63
	2005	630	730	64,000	8.4	2.7 [0.94]	189/189	63/63
	2006	640	820	49,000	5.8	1.0 [0.3]	192/192	64/64
	2007	570	900	61,000	3.2	1.1 [0.4]	192/192	64/64
	2008	780	940	96,000	9.0	1.7 [0.7]	192/192	64/64

p,p′-DDD	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	540	690	51,000	tr(2.2)	2.4 [0.8]	189/189	63/63
	2003	590	580	32,000	3.7	0.9 [0.3]	186/186	62/62
	2004	550	550	75,000	4	2 [0.7]	189/189	63/63
	2005	520	570	210,000	5.2	1.7 [0.64]	189/189	63/63
	2006	490	540	53,000	2.2	0.7 [0.2]	192/192	64/64
	2007	430	550	80,000	3.5	1.0 [0.4]	192/192	64/64
	2008	610	660	300,000	2.8	1.0 [0.4]	192/192	64/64

<Wildlife>

p,p'-DDT: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 12～1,400 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 7～2,900 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 56～270 pg/g-wet. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from gray starlings was identified as statistically significant.

p,p'-DDE: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 120～5,800 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 320～53,000 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 7,500～160,000 pg/g-wet.

p,p'-DDD: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 6～1,300 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 33～4,100 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 35～1,100 pg/g-wet. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from black-tailded gulls was identified as statistically significant.

Stocktaking of the detection of *p,p'*-DDT, *p,p'*-DDE and *p,p'*-DDD in wildlife (bivalves, fish and birds) during FY2002~2008

p,p'-DDT	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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	280	340	2,600	48	3.2 [1.1]	31/31	7/7
	2005	180	170	1,300	66	5.1 [1.7]	31/31	7/7
	2006	210	220	1,100	56	6 [2]	31/31	7/7
	2007	200	150	1,200	49	5 [2]	31/31	7/7
	2008	130	100	1,400	12	5 [2]	31/31	7/7
Fish (pg/g-wet)	2002	330	450	24,000	6.8	4.2 [1.4]	70/70	14/14
	2003	210	400	1,900	tr(3.7)	11 [3.5]	70/70	14/14
	2004	310	330	53,000	5.5	3.2 [1.1]	70/70	14/14
	2005	250	330	8,400	tr(3.8)	5.1 [1.7]	80/80	16/16
	2006	280	340	3,000	tr(5)	6 [2]	80/80	16/16
	2007	250	320	1,800	9	5 [2]	80/80	16/16
	2008	270	310	2,900	7	5 [2]	85/85	17/17
Birds (pg/g-wet)	2002	380	510	1,300	76	4.2 [1.4]	10/10	2/2
	2003	540	620	1,400	180	11 [3.5]	10/10	2/2
	2004	330	320	700	160	3.2 [1.1]	10/10	2/2
	2005	410	550	900	180	5.1 [1.7]	10/10	2/2
	2006	420	490	1,800	110	6 [2]	10/10	2/2
	2007	450	350	1,900	160	5 [2]	10/10	2/2
	2008	150	170	270	56	5 [2]	10/10	2/2

p,p'-DDE	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Bivalves (pg/g-wet)	2002	1,100	1,700	6,000	140	2.4 [0.8]	38/38	8/8
	2003	1,100	1,000	6,500	190	5.7 [1.9]	30/30	6/6
	2004	1,000	1,400	8,400	220	8.2 [2.7]	31/31	7/7
	2005	1,100	1,600	6,600	230	8.5 [2.8]	31/31	7/7
	2006	910	1,200	6,000	160	1.9 [0.7]	31/31	7/7
	2007	980	1,200	5,600	180	3 [1]	31/31	7/7
	2008	820	1,100	5,800	120	3 [1]	31/31	7/7
Fish (pg/g-wet)	2002	2,500	2,200	98,000	510	2.4 [0.8]	70/70	14/14
	2003	2,000	2,200	12,000	180	5.7 [1.9]	70/70	14/14
	2004	2,500	2,100	52,000	390	8.2 [2.7]	70/70	14/14
	2005	2,200	2,400	73,000	230	8.5 [2.8]	80/80	16/16
	2006	2,100	2,600	28,000	280	1.9 [0.7]	80/80	16/16
	2007	2,100	2,000	22,000	160	3 [1]	80/80	16/16
	2008	2,300	2,000	53,000	320	3 [1]	85/85	17/17
Birds (pg/g-wet)	2002	36,000	60,000	170,000	8,100	2.4 [0.8]	10/10	2/2
	2003	63,000	76,000	240,000	18,000	5.7 [1.9]	10/10	2/2
	2004	34,000	65,000	200,000	6,800	8.2 [2.7]	10/10	2/2
	2005	44,000	86,000	300,000	7,100	8.5 [2.8]	10/10	2/2
	2006	35,000	57,000	160,000	5,900	1.9 [0.7]	10/10	2/2
	2007	38,000	56,000	320,000	6,700	3 [1]	10/10	2/2
	2008	45,000	79,000	160,000	7,500	3 [1]	10/10	2/2

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	380	640	2,600	tr(7.5)	9.9 [3.3]	30/30	6/6
	2004	300	240	8,900	7.8	2.2 [0.7]	31/31	7/7
	2005	300	800	1,700	13	2.9 [0.97]	31/31	7/7
	2006	240	480	1,400	7.3	2.4 [0.9]	31/31	7/7
	2007	250	360	1,500	7	3 [1]	31/31	7/7
	2008	230	280	1,300	6	3 [1]	31/31	7/7
Fish (pg/g-wet)	2002	610	680	14,000	80	5.4 [1.8]	70/70	14/14
	2003	500	520	3,700	43	9.9 [3.3]	70/70	14/14
	2004	640	510	9,700	56	2.2 [0.7]	70/70	14/14
	2005	470	650	6,700	29	2.9 [0.97]	80/80	16/16
	2006	500	580	4,300	60	2.4 [0.9]	80/80	16/16
	2007	440	490	4,100	36	3 [1]	80/80	16/16
	2008	440	440	4,100	33	3 [1]	85/85	17/17
Birds (pg/g-wet)	2002	560	740	3,900	140	5.4 [1.8]	10/10	2/2
	2003	590	860	3,900	110	9.9 [3.3]	10/10	2/2
	2004	310	520	1,400	52	2.2 [0.7]	10/10	2/2
	2005	300	540	1,400	45	2.9 [0.97]	10/10	2/2
	2006	370	740	1,800	55	2.4 [0.9]	10/10	2/2
	2007	430	780	2,300	70	3 [1]	10/10	2/2
	2008	240	490	1,100	35	3 [1]	10/10	2/2

<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 0.03 pg/m^3, and the detection range was 0.76～27 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 0.22～15 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 0.02 pg/m^3, and the detection range was 0.98～96 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.02 pg/m^3, and the detection range was 0.89～22 pg/m^3.

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 0.009 pg/m^3, and the detection range was 0.037～1.1 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.009 pg/m^3, and the detection range was 0.036～0.31 pg/m^3.

Stocktaking of the detection of *p,p'*-DDT, *p,p'*-DDE and *p,p'*-DDD in air during FY2002~2008

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
***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
***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

○ *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 48 sites, and it was detected at 44 of the 48 valid sites adopting the detection limit of 0.5 pg/L, and none of the detected concentrations exceeded 230 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendencies in specimens from lake area and sea area were identified as statistically significant, and reduction tendency of the concentration in specimens from overall areas was also identified as statistically significant.

o,p'-DDE: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 39 of the 48 valid sites adopting the detection limit of 0.3 pg/L, and none of the detected concentrations exceeded 260 pg/L. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from sea area was identified as statistically significant.

o,p'-DDD: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 47 of the 48 valid sites adopting the detection limit of 0.3 pg/L, and none of the detected concentrations exceeded 170 pg/L.

Stocktaking of the detection of *o,p'*-DDT, *o,p'*-DDE and *o,p'*-DDD in surface water during FY2002~2008

o,p'-DDT	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	5.1	4.6	77	0.19	1.2 [0.4]	114/114	38/38
	2003	6	5	100	tr(1.5)	3 [0.7]	36/36	36/36
	2004	tr(4.5)	5	85	nd	5 [2]	29/38	29/38
	2005	3	3	39	nd	3 [1]	42/47	42/47
	2006	2.8	2.4	52	0.51	2.3 [0.8]	48/48	48/48
	2007	tr(2.1)	tr(2.2)	86	nd	2.5 [0.8]	38/48	38/48
	2008	3.1	3.0	230	nd	1.4 [0.5]	44/48	44/48
***o,p'*-DDE**	**Monitored year**	**Geometric mean**	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**Detection frequency**	
							Sample	**Site**
Surface water (pg/L)	2002	2.3	2.1	680	nd	0.9 [0.3]	113/114	38/38
	2003	2.2	2.0	170	tr(0.42)	0.8 [0.3]	36/36	36/36
	2004	3	2	170	tr(0.6)	2 [0.5]	38/38	38/38
	2005	2.5	2.1	410	0.4	1.2 [0.4]	47/47	47/47
	2006	tr(1.6)	tr(1.4)	210	nd	2.6 [0.9]	28/48	28/48
	2007	tr(1.5)	tr(1.1)	210	nd	2.3 [0.8]	29/48	29/48
	2008	1.5	1.8	260	nd	0.7 [0.3]	39/48	39/48
***o,p'*-DDD**	**Monitored year**	**Geometric mean**	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**Detection frequency**	
							Sample	**Site**
Surface water (pg/L)	2002	5.5	6.0	110	nd	0.60 [0.20]	113/114	38/38
	2003	7.1	5.0	160	1.1	0.8 [0.3]	36/36	36/36
	2004	6	5	81	tr(0.7)	2 [0.5]	38/38	38/38
	2005	5.2	5.4	51	tr(0.5)	1.2 [0.4]	47/47	47/47
	2006	2.5	3.3	39	nd	0.8 [0.3]	40/48	40/48
	2007	4.6	3.9	41	tr(0.3)	0.8 [0.3]	48/48	48/48
	2008	6.7	7.2	170	nd	0.8 [0.3]	47/48	47/48

<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 0.6 pg/g-dry, and the detection range was tr(0.7)～140,000 pg/g-dry. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from averall areas was identified as statistically significant.

o,p'-DDE: The presence of the substance in sediment was monitored at 64 sites, and it was detected at 63 of the 64 valid sites adopting the detection limit of 0.6 pg/g-dry, and none of the detected concentrations exceeded 37,000 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 0.1 pg/g-dry, and the detection range was 0.5～50,000 pg/g-dry.

Stocktaking of the detection of *o,p'*-DDT, *o,p'*-DDE and *o,p'*-DDD in sediment during FY2002~2008

o,p'-DDT	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Sediment (pg/g-dry)	2002	57	47	27,000	nd	6 [2]	183/189	62/63
	2003	43	43	3,200	nd	0.8 [0.3]	185/186	62/62
	2004	52	50	17,000	tr(1.1)	2 [0.6]	189/189	63/63
	2005	47	46	160,000	0.8	0.8 [0.3]	189/189	63/63
	2006	49	52	18,000	tr(0.8)	1.2 [0.4]	192/192	64/64
	2007	31	31	27,000	nd	1.8 [0.6]	186/192	63/64
	2008	39	40	140,000	tr(0.7)	1.5 [0.6]	192/192	64/64
o,p'-DDE	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Sediment (pg/g-dry)	2002	46	37	16,000	nd	3 [1]	188/189	63/63
	2003	43	39	24,000	tr(0.5)	0.6 [0.2]	186/186	62/62
	2004	35	34	28,000	nd	3 [0.8]	184/189	63/63
	2005	35	32	31,000	nd	2.6 [0.9]	181/189	62/63
	2006	37	40	27,000	tr(0.4)	1.1 [0.4]	192/192	64/64
	2007	31	41	25,000	nd	1.2 [0.4]	186/192	63/64
	2008	42	48	37,000	nd	1.4 [0.6]	186/192	63/64
o,p'-DDD	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Sediment (pg/g-dry)	2002	140	150	14,000	nd	6 [2]	184/189	62/63
	2003	140	130	8,800	tr(1.0)	2 [0.5]	186/186	62/62
	2004	120	120	16,000	tr(0.7)	2 [0.5]	189/189	63/63
	2005	110	110	32,000	tr(0.8)	1.0 [0.3]	189/189	63/63
	2006	110	110	13,000	tr(0.3)	0.5 [0.2]	192/192	64/64
	2007	97	130	21,000	tr(0.5)	1.0 [0.4]	192/192	64/64
	2008	140	150	50,000	0.5	0.3 [0.1]	192/192	64/64

<Wildlife>

o,p'-DDT: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 5～330 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 3～720 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and none of the detected concentrations exceeded 16 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendencies in specimens from bivalves and gray starlings were identified as statistically significant, and reduction tendency in specimens from overall birds including black-taild gulls was also identified as statistically significant.

o,p'-DDE: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 8～390 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was tr(1)～13,000 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in 1 of the 2 valid areas adopting the detection limit of 1 pg/g-wet, and none of the detected concentrations exceeded 3 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from black-taild gulls was identified as statistically significant, and reduction tendency in specimens from overall birds including gray starlings was also identified as statistically significant.

o,p'-DDD: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 5～1,100 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in 16 of the 17 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded 1,000 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was tr(2)～14 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendencies in specimens from black-taild gulls and gray starlings were identified as statistically significant, and reduction tendency in specimens from overall birds was also identified as statistically significant.

Stocktaking of the detection of *o,p'*-DDT, *o,p'*-DDE and *o,p'*-DDD in wildlife (bivalves, fish and birds) during FY2002~2008

o,p'-DDT	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	100	83	480	22	12 [4]	38/38	8/8
	2003	130	120	480	35	2.9 [0.97]	30/30	6/6
	2004	130	140	910	20	1.8 [0.61]	31/31	7/7
	2005	75	57	440	29	2.6 [0.86]	31/31	7/7
	2006	76	79	380	24	3 [1]	31/31	7/7
	2007	64	52	350	20	3 [1]	31/31	7/7
	2008	46	37	330	5	3 [1]	31/31	7/7
Fish (pg/g-wet)	2002	110	130	2,300	tr(6)	12 [4]	70/70	14/14
	2003	80	120	520	2.9	2.9 [0.97]	70/70	14/14
	2004	130	140	1,800	3.7	1.8 [0.61]	70/70	14/14
	2005	94	110	1,500	5.8	2.6 [0.86]	80/80	16/16
	2006	91	110	700	6	3 [1]	80/80	16/16
	2007	66	90	430	3	3 [1]	80/80	16/16
	2008	68	92	720	3	3 [1]	85/85	17/17
Birds (pg/g-wet)	2002	tr(10)	tr(10)	58	nd	12 [4]	8/10	2/2
	2003	18	16	66	8.3	2.9 [0.97]	10/10	2/2
	2004	7.7	13	43	tr(0.9)	1.8 [0.61]	10/10	2/2
	2005	11	14	24	3.4	2.6 [0.86]	10/10	2/2
	2006	10	10	120	3	3 [1]	10/10	2/2
	2007	8	9	26	tr(2)	3 [1]	10/10	2/2
	2008	3	6	16	nd	3 [1]	8/10	2/2
o,p'-DDE	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	88	66	1,100	13	3.6 [1.2]	38/38	8/8
	2003	84	100	460	17	3.6 [1.2]	30/30	6/6
	2004	70	69	360	19	2.1 [0.69]	31/31	7/7
	2005	66	89	470	12	3.4 [1.1]	31/31	7/7
	2006	56	81	340	12	3 [1]	31/31	7/7
	2007	51	69	410	8.9	2.3 [0.9]	31/31	7/7
	2008	45	52	390	8	3 [1]	31/31	7/7
Fish (pg/g-wet)	2002	77	50	13,000	3.6	3.6 [1.2]	70/70	14/14
	2003	48	54	2,500	nd	3.6 [1.2]	67/70	14/14
	2004	68	48	5,800	tr(0.9)	2.1 [0.69]	70/70	14/14
	2005	50	45	12,000	tr(1.4)	3.4 [1.1]	80/80	16/16
	2006	50	43	4,800	tr(1)	3 [1]	80/80	16/16
	2007	43	29	4,400	nd	2.3 [0.9]	79/80	16/16
	2008	46	37	13,000	tr(1)	3 [1]	85/85	17/17
Birds (pg/g-wet)	2002	28	26	49	20	3.6 [1.2]	10/10	2/2
	2003	tr(2.0)	tr(2.0)	4.2	nd	3.6 [1.2]	9/10	2/2
	2004	tr(1.0)	tr(1.1)	3.7	nd	2.1 [0.69]	5/10	1/2
	2005	tr(1.4)	tr(1.9)	tr(2.9)	nd	3.4 [1.1]	7/10	2/2
	2006	tr(2)	tr(2)	3	tr(1)	3 [1]	10/10	2/2
	2007	tr(1.1)	tr(1.4)	2.8	nd	2.3 [0.9]	6/10	2/2
	2008	nd	tr(1)	3	nd	3 [1]	5/10	1/2

o,p'-DDD	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	130	190	2,900	tr(9)	12 [4]	38/38	8/8
	2003	200	220	1,900	6.5	6.0 [2.0]	30/30	6/6
	2004	160	130	2,800	6.0	5.7 [1.9]	31/31	7/7
	2005	140	280	1,800	10	3.3 [1.1]	31/31	7/7
	2006	120	200	1,000	7	4 [1]	31/31	7/7
	2007	130	200	1,200	6	3 [1]	31/31	7/7
	2008	110	140	1,100	5	4 [2]	31/31	7/7
Fish (pg/g-wet)	2002	83	90	1,100	nd	12 [4]	66/70	14/14
	2003	73	96	920	nd	6.0 [2.0]	66/70	14/14
	2004	100	96	1,700	nd	5.7 [1.9]	68/70	14/14
	2005	77	81	1,400	nd	3.3 [1.1]	79/80	16/16
	2006	76	86	1,100	tr(1)	4 [1]	80/80	16/16
	2007	63	62	1,300	nd	3 [1]	78/80	16/16
	2008	62	74	1,000	nd	4 [2]	80/85	16/17
Birds (pg/g-wet)	2002	15	15	23	tr(8)	12 [4]	10/10	2/2
	2003	14	14	36	tr(5.0)	6.0 [2.0]	10/10	2/2
	2004	tr(5.6)	5.7	25	nd	5.7 [1.9]	9/10	2/2
	2005	7.1	7.5	9.7	4.7	3.3 [1.1]	10/10	2/2
	2006	8	8	19	5	4 [1]	10/10	2/2
	2007	7	7	10	5	3 [1]	10/10	2/2
	2008	4	tr(3)	14	tr(2)	4 [2]	10/10	2/2

<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 0.01 pg/m^3, and the detection range was 0.33～18 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.01 pg/m^3, and the detection range was 0.32～6.5 pg/m^3. As results of the inter-annual trend analysis from FY 2003 to FY 2008, reduction tendencies in specimens at both seasons 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 0.009 pg/m^3, and the detection range was 0.11～5.0 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.009 pg/m^3, and the detection range was 0.15～1.1 pg/m^3. As results of the inter-annual trend analysis from FY 2003 to FY 2008, reduction tendencies in specimens at both seasons 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 0.01 pg/m^3, and the detection range was 0.05～1.6 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.01 pg/m^3, and the detection range was 0.04～0.26 pg/m^3. As results of the inter-annual trend analysis from FY 2003 to FY 2008, reduction tendencies in specimens at both seasons were identified as statistically significant.

Stocktaking of the detection of *o,p'*-DDT, *o,p'*-DDE and *o,p'*-DDD in air during FY2002~2008

o,p'-DDT	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	2.2	2.0	40	0.41	0.15 [0.05]	102/102	34/34
	2003 Warm season	6.9	7.7	38	0.61	0.12 [0.040]	35/35	35/35
	2003 Cold season	1.6	1.4	6.4	0.43		34/34	34/34
	2004 Warm season	5.1	5.4	22	0.54	0.093 [0.031]	37/37	37/37
	2004 Cold season	1.5	1.4	9.4	0.35		37/37	37/37
	2005 Warm season	3.0	3.1	14	0.67	0.10 [0.034]	37/37	37/37
	2005 Cold season	0.76	0.67	3.0	0.32		37/37	37/37
	2006 Warm season	2.5	2.4	20	0.55	0.09 [0.03]	37/37	37/37
	2006 Cold season	0.90	0.79	3.9	0.37		37/37	37/37
	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

o,p'-DDE	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	0.60	0.56	8.5	0.11	0.03 [0.01]	102/102	34/34
	2003 Warm season	1.4	1.5	7.5	0.17	0.020 [0.0068]	35/35	35/35
	2003 Cold season	0.50	0.47	1.7	0.18		34/34	34/34
	2004 Warm season	1.1	1.2	8.9	0.14	0.037 [0.012]	37/37	37/37
	2004 Cold season	0.53	0.49	3.9	0.14		37/37	37/37
	2005 Warm season	1.6	1.5	7.9	0.33	0.074 [0.024]	37/37	37/37
	2005 Cold season	0.62	0.59	2.0	0.24		37/37	37/37
	2006 Warm season	1.1	1.1	7.4	nd	0.09 [0.03]	36/37	36/37
	2006 Cold season	0.65	0.56	2.6	0.19		37/37	37/37
	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

o,p'-DDD	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	0.14	0.18	0.85	nd	0.021 [0.007]	97/102	33/34
	2003 Warm season	0.37	0.42	1.3	0.059	0.042 [0.014]	35/35	35/35
	2003 Cold season	0.15	0.14	0.42	0.062		34/34	34/34
	2004 Warm season	0.31	0.33	2.6	tr(0.052)	0.14 [0.048]	37/37	37/37
	2004 Cold season	0.14	tr(0.13)	0.86	nd		35/37	35/37
	2005 Warm season	0.22	0.19	0.90	tr(0.07)	0.10 [0.03]	37/37	37/37
	2005 Cold season	tr(0.07)	tr(0.07)	0.21	nd		35/37	35/37
	2006 Warm season	0.28	0.28	1.4	tr(0.05)	0.10 [0.03]	37/37	37/37
	2006 Cold season	0.12	0.11	0.79	nd		34/37	34/37
	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

[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 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.6 pg/L, and the detection range was 2.9～480 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from lake area was identified as statistically significant, and reduction tendency in specimens from overall areas was also identified as statistically significant.

trans-Chlordane: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 1 pg/L, and the detection range was 3～420 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendencies in specimens from lake area and sea area were identified as statistically significant, and reduction tendency in specimens from overall areas was also identified as statistically significant.

Stocktaking of the detection of *cis*-Chlordane and *trans*-Chlordane in surface water FY2002~2008

cis-Chlordane	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	41	32	880	2.5	0.9 [0.3]	114/114	38/38
	2003	69	51	920	12	3 [0.9]	36/36	36/36
	2004	92	87	1,900	10	6 [2]	38/38	38/38
	2005	53	54	510	6	4 [1]	47/47	47/47
	2006	31	26	440	5	5 [2]	48/48	48/48
	2007	23	22	680	nd	4 [2]	47/48	47/48
	2008	29	29	480	2.9	1.6 [0.6]	48/48	48/48

trans-Chlordane	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	32	24	780	3.1	1.5 [0.5]	114/114	38/38
	2003	34	30	410	6	5 [2]	36/36	36/36
	2004	32	26	1,200	5	5 [2]	38/38	38/38
	2005	25	21	200	3	4 [1]	47/47	47/47
	2006	24	16	330	tr(4)	7 [2]	48/48	48/48
	2007	16	20	580	nd	2.4 [0.8]	47/48	47/48
	2008	23	22	420	3	3 [1]	48/48	48/48

<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 0.9 pg/g-dry, and the detection range was tr(2.3)～11,000 pg/g-dry. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from sea area was 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 0.8 pg/g-dry, and the detection range was 2.4～10,000 pg/g-dry. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from sea area was identified as statistically significant.

Stocktaking of the detection of *cis*-Chlordane and *trans*-Chlordane in sediment FY2002~2008

cis-Chlordane	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	120	98	18,000	1.8	0.9 [0.3]	189/189	63/63
	2003	170	140	19,000	tr(3.6)	4 [2]	186/186	62/62
	2004	140	97	36,000	4	4 [2]	189/189	63/63
	2005	140	100	44,000	3.3	1.9 [0.64]	189/189	63/63
	2006	90	70	13,000	tr(0.9)	2.4 [0.8]	192/192	64/64
	2007	73	55	7,500	nd	5 [2]	191/192	64/64
	2008	89	63	11,000	tr(2.3)	2.4 [0.9]	192/192	64/64
trans-Chlordane	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	130	110	16,000	2.1	1.8 [0.6]	189/189	63/63
	2003	120	100	13,000	tr(2.4)	4 [2]	186/186	62/62
	2004	95	80	26,000	3	3 [0.9]	189/189	63/63
	2005	98	81	32,000	3.4	2.3 [0.84]	189/189	63/63
	2006	98	76	12,000	2.2	1.1 [0.4]	192/192	64/64
	2007	72	58	7,500	nd	2.2 [0.8]	191/192	64/64
	2008	93	66	10,000	2.4	2.0 [0.8]	192/192	64/64

<Wildlife>

cis-Chlordane: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 85～11,000 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 36～3,500 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was tr(3)～280 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendencies in specimens from black-taild gulls and gray starlings were identified as statistically significant.

trans-Chlordane: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 52～1,300 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was 14～1,300 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 3 pg/g-wet, and none of the detected concentrations exceeded 27 pg/g-wet. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from overall birds was identified as statistically significant.

Stocktaking of the detection of *cis*-Chlordane and *trans*-Chlordane in wildlife (bivalves, fish and birds) FY2002~2008

cis-Chlordane	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	810	1,200	26,000	24	2.4 [0.8]	38/38	8/8
	2003	1,100	1,400	14,000	110	3.9 [1.3]	30/30	6/6
	2004	1,200	1,600	14,000	91	18 [5.8]	31/31	7/7
	2005	820	960	13,000	78	12 [3.9]	31/31	7/7
	2006	810	1,100	18,000	67	4 [1]	31/31	7/7
	2007	760	590	19,000	59	5 [2]	31/31	7/7
	2008	660	560	11,000	85	5 [2]	31/31	7/7
Fish (pg/g-wet)	2002	580	550	6,900	57	2.4 [0.8]	70/70	14/14
	2003	490	400	4,400	43	3.9 [1.3]	70/70	14/14
	2004	580	490	9,800	68	18 [5.8]	70/70	14/14
	2005	490	600	8,000	42	12 [3.9]	80/80	16/16
	2006	490	420	4,900	56	4 [1]	80/80	16/16
	2007	410	360	5,200	30	5 [2]	80/80	16/16
	2008	410	340	3,500	36	5 [2]	85/85	17/17
Birds (pg/g-wet)	2002	67	180	450	10	2.4 [0.8]	10/10	2/2
	2003	47	120	370	6.8	3.9 [1.3]	10/10	2/2
	2004	39	110	240	tr(5.8)	18 [5.8]	10/10	2/2
	2005	49	120	340	tr(5.8)	12 [3.9]	10/10	2/2
	2006	32	83	250	5	4 [1]	10/10	2/2
	2007	30	83	230	tr(4)	5 [2]	10/10	2/2
	2008	26	87	280	tr(3)	5 [2]	10/10	2/2

trans-Chlordane	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	420	840	2,300	33	2.4 [0.8]	38/38	8/8
	2003	550	840	2,800	69	7.2 [2.4]	30/30	6/6
	2004	510	770	2,800	53	48 [16]	31/31	7/7
	2005	370	660	2,400	40	10 [3.5]	31/31	7/7
	2006	370	580	2,800	41	4 [2]	31/31	7/7
	2007	360	460	1,500	34	6 [2]	31/31	7/7
	2008	300	410	1,300	52	7 [3]	31/31	7/7
Fish (pg/g-wet)	2002	180	160	2,700	20	2.4 [0.8]	70/70	14/14
	2003	150	120	1,800	9.6	7.2 [2.4]	70/70	14/14
	2004	190	130	5,200	tr(17)	48 [16]	70/70	14/14
	2005	150	180	3,100	tr(9.8)	10 [3.5]	76/80	16/16
	2006	150	120	2,000	14	4 [2]	80/80	16/16
	2007	120	100	2,100	8	6 [2]	80/80	16/16
	2008	120	71	1,300	14	7 [3]	85/85	17/17
Birds (pg/g-wet)	2002	14	14	26	8.9	2.4 [0.8]	10/10	2/2
	2003	11	12	27	tr(5.9)	7.2 [2.4]	10/10	2/2
	2004	tr(14)	tr(11)	tr(26)	nd	48 [16]	5/10	1/2
	2005	10	12	30	tr(4.5)	10 [3.5]	10/10	2/2
	2006	7	8	17	tr(3)	4 [2]	10/10	2/2
	2007	7	8	19	tr(3)	6 [2]	10/10	2/2
	2008	tr(6)	9	27	nd	7 [3]	7/10	2/2

<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 0.05 pg/m^3, and the detection range was 1.9～790 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.05 pg/m^3, and the detection range was 1.5～200 pg/m^3.

trans-Chlordane: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.06 pg/m^3, and the detection range was 2.5～990 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.06 pg/m^3, and the detection range was 1.8～250 pg/m^3.

Stocktaking of the detection of *cis*-Chlordane and *trans*-Chlordane in air during FY2002~2008

cis-Chlordane	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	31	40	670	0.86	0.60 [0.20]	102/102	34/34
	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
trans-Chlordane	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	36	48	820	0.62	0.60 [0.20]	102/102	34/34
	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

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

<Surface Water>

Oxychlordane: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 40 of the 48 valid sites adopting the detection limit of 0.7 pg/L, and none of the detected concentrations exceeded 14 pg/L. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from river mouth area was identified as statistically significant.

cis-Nonachlor: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.3 pg/L, and the detection range was 0.9～130 pg/L. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from lake area was identified as statistically significant.

trans-Nonachlor: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.6 pg/L, and the detection range was 1.9～340 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendencies in specimens from lake area and sea area were identified as statistically significant, and reduction tendency in specimens from overall areas was also identified as statistically significant.

Stocktaking of the detection of Oxychlordane, *cis*-Nonachlor and *trans*-Nonachlor in surface water during FY2002~2008

Oxychlordane	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Surface water (pg/L)	2002	2.4	3.5	41	nd	1.2 [0.4]	96/114	35/38
	2003	3	2	39	tr(0.6)	2 [0.5]	36/36	36/36
	2004	3.2	2.9	47	tr(0.7)	2 [0.5]	38/38	38/38
	2005	2.6	2.1	19	nd	1.1 [0.4]	46/47	46/47
	2006	tr(2.5)	tr(2.4)	18	nd	2.8 [0.9]	43/48	43/48
	2007	tr(2)	nd	41	nd	6 [2]	25/48	25/48
	2008	1.9	1.9	14	nd	1.9 [0.7]	40/48	40/48
cis-Nonachlor	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Sample	Site
Surface water (pg/L)	2002	7.6	6.7	250	0.23	1.8 [0.6]	114/114	38/38
	2003	8.0	7.0	130	1.3	0.3 [0.1]	36/36	36/36
	2004	7.5	6.3	340	0.8	0.6 [0.2]	38/38	38/38
	2005	6.0	5.9	43	0.9	0.5 [0.2]	47/47	47/47
	2006	6.6	5.6	83	1.0	0.8 [0.3]	48/48	48/48
	2007	5.9	6.1	210	nd	2.4 [0.8]	43/48	43/48
	2008	6.5	5.9	130	0.9	0.9 [0.3]	48/48	48/48
trans-Nonachlor	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Sample	Site
Surface water (pg/L)	2002	29	24	780	1.8	1.2 [0.4]	114/114	38/38
	2003	26	20	450	4	2 [0.5]	36/36	36/36
	2004	25	19	1,100	tr(3)	4 [2]	38/38	38/38
	2005	20	17	150	2.6	2.5 [0.84]	47/47	47/47
	2006	21	16	310	3.2	3.0 [1.0]	48/48	48/48
	2007	17	17	540	tr(2)	5 [2]	48/48	48/48
	2008	18	17	340	1.9	1.6 [0.6]	48/48	48/48

<Sediment>

Oxychlordane: The presence of the substance in sediment was monitored at 64 sites, and it was detected at 48 of the 64 valid sites adopting the detection limit of 1 pg/g-dry, and none of the detected concentrations exceeded 340 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 0.2 pg/g-dry, and the detection range was 1.1～5,100 pg/g-dry.

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 0.8 pg/g-dry, and the detection range was tr(1.6)～8,400 pg/g-dry.

Stocktaking of the detection of Oxychlordane, *cis*-Nonachlor and *trans*-Nonachlor in sediment during FY2002~2008

Oxychlordane	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	2.2	1.7	120	nd	1.5 [0.5]	153/189	59/63
	2003	2	2	85	nd	1 [0.4]	158/186	57/62
	2004	tr(2.0)	tr(1.3)	140	nd	3 [0.8]	129/189	54/63
	2005	2.1	tr(1.9)	160	nd	2.0 [0.7]	133/189	51/63
	2006	tr(2.4)	tr(1.7)	280	nd	2.9 [1.0]	141/192	54/64
	2007	tr(1.8)	tr(1.5)	76	nd	2.5 [0.9]	117/192	46/64
	2008	tr(2)	tr(1)	340	nd	3 [1]	110/192	48/64

cis-Nonachlor	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	65	66	7,800	nd	2.1 [0.7]	188/189	63/63
	2003	59	50	6,500	nd	3 [0.9]	184/186	62/62
	2004	46	34	9,400	tr(0.8)	2 [0.6]	189/189	63/63
	2005	50	42	9,900	tr(1.1)	1.9 [0.64]	189/189	63/63
	2006	52	48	5,800	tr(0.6)	1.2 [0.4]	192/192	64/64
	2007	43	35	4,200	nd	1.6 [0.6]	191/192	64/64
	2008	49	42	5,100	1.1	0.6 [0.2]	192/192	64/64

trans-Nonachlor	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	120	83	13,000	3.1	1.5 [0.5]	189/189	63/63
	2003	100	78	11,000	2	2 [0.6]	186/186	62/62
	2004	83	63	23,000	3	2 [0.6]	189/189	63/63
	2005	89	72	24,000	2.4	1.5 [0.54]	189/189	63/63
	2006	91	65	10,000	3.4	1.2 [0.4]	192/192	64/64
	2007	70	55	8,400	tr(1.6)	1.7 [0.6]	192/192	64/64
	2008	79	53	8,400	tr(1.6)	2.2 [0.8]	192/192	64/64

<Wildlife>

Oxychlordane: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 7～1,100 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 15～2,200 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 290～960 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from gray starlings was identified as statistically significant, and reduction tendency in specimens from overall birds including black-taild gulls was also identified as statistically significant.

cis-Nonachlor: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 33～780 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 46～3,200 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 37～410 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendencies in specimens from black-taild gulls and gray starlings were identified as statistically significant.

trans-Nonachlor: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 94～2,000 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 87～6,900 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 180～2,600 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendencies in specimens from black-taild gulls and gray starlings were identified as statistically significant.

Stocktaking of the detection of Oxychlordane, *cis*-Nonachlor and *trans*-Nonachlor in wildlife (bivalves, fish and birds) during FY2002~2008

Oxychlordane	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	76	83	5,600	nd	3.6 [1.2]	37/38	8/8
	2003	90	62	1,900	11	8.4 [2.8]	30/30	6/6
	2004	110	100	1,700	14	9.2 [3.1]	31/31	7/7
	2005	81	79	1,400	12	9.3 [3.1]	31/31	7/7
	2006	77	90	2,400	7	7 [3]	31/31	7/7
	2007	62	43	2,200	8	6 [2]	31/31	7/7
	2008	54	55	1,100	7	7 [2]	31/31	7/7
Fish (pg/g-wet)	2002	160	140	3,900	16	3.6 [1.2]	70/70	14/14
	2003	140	160	820	30	8.4 [2.8]	70/70	14/14
	2004	150	140	1,500	25	9.2 [3.1]	70/70	14/14
	2005	140	150	1,900	20	9.3 [3.1]	80/80	16/16
	2006	140	120	3,000	28	7 [3]	80/80	16/16
	2007	120	100	1,900	17	6 [2]	80/80	16/16
	2008	120	130	2,200	15	7 [2]	85/85	17/17
Birds (pg/g-wet)	2002	640	630	890	470	3.6 [1.2]	10/10	2/2
	2003	750	700	1,300	610	8.4 [2.8]	10/10	2/2
	2004	460	450	730	320	9.2 [3.1]	10/10	2/2
	2005	600	660	860	390	9.3 [3.1]	10/10	2/2
	2006	500	560	720	270	7 [3]	10/10	2/2
	2007	440	400	740	290	6 [2]	10/10	2/2
	2008	530	530	960	290	7 [2]	10/10	2/2

cis-Nonachlor	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	190	300	870	8.6	1.2 [0.4]	38/38	8/8
	2003	290	260	1,800	48	4.8 [1.6]	30/30	6/6
	2004	280	380	1,800	43	3.4 [1.1]	31/31	7/7
	2005	220	220	1,300	27	4.5 [1.5]	31/31	7/7
	2006	210	180	1,500	31	3 [1]	31/31	7/7
	2007	210	250	1,000	26	3 [1]	31/31	7/7
	2008	180	210	780	33	4 [1]	31/31	7/7
Fish (pg/g-wet)	2002	420	420	5,100	46	1.2 [0.4]	70/70	14/14
	2003	350	360	2,600	19	4.8 [1.6]	70/70	14/14
	2004	410	310	10,000	48	3.4 [1.1]	70/70	14/14
	2005	360	360	6,200	27	4.5 [1.5]	80/80	16/16
	2006	360	330	3,300	33	3 [1]	80/80	16/16
	2007	310	280	3,700	16	3 [1]	80/80	16/16
	2008	330	300	3,200	46	4 [1]	85/85	17/17
Birds (pg/g-wet)	2002	200	240	450	68	1.2 [0.4]	10/10	2/2
	2003	200	260	660	68	4.8 [1.6]	10/10	2/2
	2004	130	150	240	73	3.4 [1.1]	10/10	2/2
	2005	160	180	370	86	4.5 [1.5]	10/10	2/2
	2006	120	130	270	60	3 [1]	10/10	2/2
	2007	120	140	300	42	3 [1]	10/10	2/2
	2008	130	150	410	37	4 [1]	10/10	2/2

trans-Nonachlor	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	510	1,100	1,800	21	2.4 [0.8]	38/38	8/8
	2003	780	700	3,800	140	3.6 [1.2]	30/30	6/6
	2004	710	870	3,400	110	13 [4.2]	31/31	7/7
	2005	570	650	3,400	72	6.2 [2.1]	31/31	7/7
	2006	530	610	3,200	85	3 [1]	31/31	7/7
	2007	540	610	2,400	71	7 [3]	31/31	7/7
	2008	440	510	2,000	94	6 [2]	31/31	7/7
Fish (pg/g-wet)	2002	970	900	8,300	98	2.4 [0.8]	70/70	14/14
	2003	880	840	5,800	85	3.6 [1.2]	70/70	14/14
	2004	1,000	760	21,000	140	13 [4.2]	70/70	14/14
	2005	910	750	13,000	80	6.2 [2.1]	80/80	16/16
	2006	910	680	6,900	120	3 [1]	80/80	16/16
	2007	780	680	7,900	71	7 [3]	80/80	16/16
	2008	820	750	6,900	87	6 [2]	85/85	17/17
Birds (pg/g-wet)	2002	880	980	1,900	350	2.4 [0.8]	10/10	2/2
	2003	1,100	1,400	3,700	350	3.6 [1.2]	10/10	2/2
	2004	680	780	1,200	390	13 [4.2]	10/10	2/2
	2005	850	880	2,000	440	6.2 [2.1]	10/10	2/2
	2006	630	620	1,500	310	3 [1]	10/10	2/2
	2007	590	680	1,400	200	7 [3]	10/10	2/2
	2008	680	850	2,600	180	6 [2]	10/10	2/2

<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 0.01 pg/m^3, and the detection range was 0.50～7.1 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.01 pg/m^3, and the detection range was 0.27～1.8 pg/m^3. As a result of the inter-annual trend analysis from FY 2003 to FY 2008, reduction tendency in specimens at the cold 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 0.01 pg/m^3, and the detection range was 0.18～87 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.01 pg/m^3, and the detection range was 0.16～19 pg/m^3.

trans-Nonachlor: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 1.5～650 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 1.3～170 pg/m^3.

Stocktaking of the detection of Oxychlordane, *cis*-Nonachlor and *trans*-Nonachlor in air during FY2002~2008

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

cis-Nonachlor	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	3.1	4.0	62	0.071	0.030 [0.010]	102/102	34/34
	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

trans-Nonachlor	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	24	30	550	0.64	0.30 [0.10]	102/102	34/34
	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

[8] Heptachlors

・ History and state of monitoring

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

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

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

<Surface Water>

Heptachlor: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 19 of the 48 valid sites adopting the detection limit of 0.8 pg/L, and none of the detected concentrations exceeded 4.6 pg/L.

cis-Heptachlor epoxide: The presence of the substance in surface water was monitored at 48 sites, and it was detected at 46 of the 48 valid sites adopting the detection limit of 0.2 pg/L, and none of the detected concentrations exceeded 37 pg/L. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from lake area was identified as statistically significant, and reduction tendency in specimens from overall areas was also identified as statistically significant.

trans-Heptachlor epoxide: The presence of the substance in surface water was monitored at 48 sites, and it was not detected at all 48 valid sites adopting the detection limit of 0.7 pg/L.

Stocktaking of the detection of Heptachlor, *cis*-Heptachlor epocide and *trans*-Heptachlor epocide in surface water during FY2002~2008

Heptachlor	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	tr(1.1)	1.0	25	nd	1.5 [0.5]	97/114	38/38
	2003	tr(1.8)	tr(1.6)	7	tr(1.0)	2 [0.5]	36/36	36/36
	2004	nd	nd	29	nd	5 [2]	9/38	9/38
	2005	nd	tr(1)	54	nd	3 [1]	25/47	25/47
	2006	nd	nd	6	nd	5 [2]	5/48	5/48
	2007	nd	nd	5.2	nd	2.4 [0.8]	12/48	12/48
	2008	nd	nd	4.6	nd	2.1 [0.8]	19/48	19/48
cis-Heptachlor epoxide	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2003	9.8	11	170	1.2	0.7 [0.2]	36/36	36/36
	2004	10	10	77	2	2 [0.4]	38/38	38/38
	2005	7.1	6.6	59	1.0	0.7 [0.2]	47/47	47/47
	2006	7.6	6.6	47	1.1	2.0 [0.7]	48/48	48/48
	2007	6.1	5.8	120	tr(0.9)	1.3 [0.4]	48/48	48/48
	2008	4.7	5.0	37	nd	0.6 [0.2]	46/48	46/48

trans-Heptachlor epoxide	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2003	nd	nd	2	nd	2 [0.4]	4/36	4/36
	2004	nd	nd	nd	nd	0.9 [0.3]	0/38	0/38
	2005	nd	nd	nd	nd	0.7 [0.2]	0/47	0/47
	2006	nd	nd	nd	nd	1.8 [0.6]	0/48	0/48
	2007	nd	nd	tr(0.9)	nd	2.0 [0.7]	2/48	2/48
	2008	nd	nd	nd	nd	1.9 [0.7]	0/48	0/48

<Sediment>

Heptachlor: The presence of the substance in sediment was monitored at 64 sites, and it was detected at 27 of the 64 valid sites adopting the detection limit of 1 pg/g-dry, and none of the detected concentrations exceeded 85 pg/g-dry.

cis-Heptachlor epoxide: 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 1 pg/g-dry, and none of the detected concentrations exceeded 180 pg/g-dry.

trans-Heptachlor epoxide: The presence of the substance in sediment was monitored at 64 sites, and it was not detected at all 64 valid sites adopting the detection limit of 0.7 pg/g-dry.

Stocktaking of the detection of Heptachlor, *cis*-Heptachlor epocide and *trans*-Heptachlor epocide in sediment during FY2002~2008

Heptachlor	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2002	3.5	3.2	120	nd	1.8 [0.6]	167/189	60/63
	2003	tr(2.4)	tr(2.2)	160	nd	3 [1]	138/186	53/62
	2004	tr(2.5)	tr(2.3)	170	nd	3 [0.9]	134/189	53/63
	2005	2.5	2.8	200	nd	2.5 [0.8]	120/189	48/63
	2006	4.6	3.9	230	nd	1.9 [0.6]	190/192	64/64
	2007	tr(1.7)	tr(1.5)	110	nd	3 [0.7]	143/192	57/64
	2008	tr(1)	nd	85	nd	4 [1]	59/192	27/64
cis-Heptachlor epoxide	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2003	4	3	160	nd	3 [1]	153/186	55/62
	2004	tr(4.4)	tr(3.0)	230	nd	6 [2]	136/189	52/63
	2005	tr(4)	tr(3)	140	nd	7 [2]	119/189	49/63
	2006	3.7	3.2	210	nd	3.0 [1.0]	157/192	58/64
	2007	3	tr(2)	270	nd	3 [1]	141/192	53/64
	2008	2	2	180	nd	2 [1]	130/192	51/64
trans-Heptachlor epoxide	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	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

<Wildlife>

Heptachlor: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 5 of the 7 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded 9 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in 7 of the 17 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded 9 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and not detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet.

cis-Heptachlor epoxide: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 8～510 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was tr(3)～350 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 180～560 pg/g-wet.

trans-Heptachlor epoxide: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 1 of the 7 valid areas adopting the detection limit of 4 pg/g-wet, and none of the detected concentrations exceeded 33 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and not detected in all 17 valid areas adopting the detection limit of 4 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and not detected in all 2 valid areas adopting the detection limit of 4 pg/g-wet.

Stocktaking of the detection of Heptachlor, *cis*-Heptachlor epocide and *trans*-Heptachlor in wildlife (bivalves, fish and birds) during FY2002~2008

Heptachlor	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	3.6	4.6	15	nd	4.2 [1.4]	28/38	6/8
	2003	tr(2.8)	tr(2.4)	14	nd	6.6 [2.2]	16/30	4/6
	2004	tr (3.5)	5.2	16	nd	4.1 [1.4]	23/31	6/7
	2005	tr(2.3)	tr(2.9)	24	nd	6.1 [2.0]	18/31	6/7
	2006	tr(3)	tr(4)	20	nd	6 [2]	23/31	6/7
	2007	tr(3)	tr(3)	12	nd	6 [2]	20/31	6/7
	2008	tr(2)	nd	9	nd	6 [2]	13/31	5/7
Fish (pg/g-wet)	2002	4.0	4.8	20	nd	4.2 [1.4]	57/70	12/14
	2003	nd	nd	11	nd	6.6 [2.2]	29/70	8/14
	2004	tr(1.9)	tr(2.1)	460	nd	4.1 [1.4]	50/70	11/14
	2005	nd	nd	7.6	nd	6.1 [2.0]	32/80	8/16
	2006	tr(2)	nd	8	nd	6 [2]	36/80	8/16
	2007	nd	nd	7	nd	6 [2]	28/80	6/16
	2008	nd	nd	9	nd	6 [2]	25/85	7/17
Birds (pg/g-wet)	2002	tr(2.1)	tr(2.8)	5.2	nd	4.2 [1.4]	7/10	2/2
	2003	nd	nd	nd	nd	6.6 [2.2]	0/10	0/2
	2004	nd	nd	tr(1.5)	nd	4.1 [1.4]	1/10	1/2
	2005	nd	nd	nd	nd	6.1 [2.0]	0/10	0/2
	2006	nd	nd	nd	nd	6 [2]	0/10	0/2
	2007	nd	nd	nd	nd	6 [2]	0/10	0/2
	2008	nd	nd	nd	nd	6 [2]	0/10	0/2
cis-Heptachlor epoxide	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2003	42	29	880	9.7	6.9 [2.3]	30/30	6/6
	2004	57	34	840	tr(9.8)	9.9 [3.3]	31/31	7/7
	2005	36	20	590	7.4	3.5 [1.2]	31/31	7/7
	2006	44	23	1,100	8	4 [1]	31/31	7/7
	2007	30	20	1,100	8	4 [1]	31/31	7/7
	2008	31	19	510	8	5 [2]	31/31	7/7
Fish (pg/g-wet)	2003	42	43	320	7.0	6.9 [2.3]	70/70	14/14
	2004	46	49	620	tr(3.3)	9.9 [3.3]	70/70	14/14
	2005	39	45	390	4.9	3.5 [1.2]	80/80	16/16
	2006	40	48	270	4	4 [1]	80/80	16/16
	2007	41	49	390	4	4 [1]	80/80	16/16
	2008	38	46	350	tr(3)	5 [2]	85/85	17/17
Birds (pg/g-wet)	2003	520	510	770	370	6.9 [2.3]	10/10	2/2
	2004	270	270	350	190	9.9 [3.3]	10/10	2/2
	2005	360	340	690	250	3.5 [1.2]	10/10	2/2
	2006	320	310	650	240	4 [1]	10/10	2/2
	2007	280	270	350	250	4 [1]	10/10	2/2
	2008	350	370	560	180	5 [2]	10/10	2/2

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	tr(4.0)	nd	55	nd	12 [4]	9/31	2/7
	2005	nd	nd	37	nd	23 [7.5]	5/31	1/7
	2006	nd	nd	45	nd	13 [5]	5/31	1/7
	2007	nd	nd	61	nd	13 [5]	5/31	1/7
	2008	nd	nd	33	nd	10 [4]	5/31	1/7
Fish (pg/g-wet)	2003	nd	nd	nd	nd	13 [4.4]	0/70	0/14
	2004	nd	nd	tr(10)	nd	12 [4]	2/70	2/14
	2005	nd	nd	nd	nd	23 [7.5]	0/80	0/16
	2006	nd	nd	nd	nd	13 [5]	0/80	0/16
	2007	nd	nd	nd	nd	13 [5]	0/80	0/16
	2008	nd	nd	nd	nd	10 [4]	0/85	0/17
Birds (pg/g-wet)	2003	nd	nd	nd	nd	13 [4.4]	0/10	0/2
	2004	nd	nd	nd	nd	12 [4]	0/10	0/2
	2005	nd	nd	nd	nd	23 [7.5]	0/10	0/2
	2006	nd	nd	nd	nd	13 [5]	0/10	0/2
	2007	nd	nd	nd	nd	13 [5]	0/10	0/2
	2008	nd	nd	nd	nd	10 [4]	0/10	0/2

<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 0.02 pg/m^3, and the detection range was 0.92～190 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.02 pg/m^3, and the detection range was 0.51～60 pg/m^3.

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 0.008 pg/m^3, and the detection range was 0.53～9.9 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.008 pg/m^3, and the detection range was 0.37～3.0 pg/m^3. As a result of the inter-annual trend analysis from FY 2003 to FY 2008, reduction tendency in specimens at the cold season was identified as statistically significant.

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 0.06 pg/m^3, and none of the detected concentrations exceeded 0.17 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and not detected at all 37 valid sites adopting the detection limit of 0.06 pg/m^3.

Stocktaking of the detection of Heptachlor, *cis*-Heptachlor epocide and *trans*-Heptachlor epocide in air during FY2002~2008

Heptachlor	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2002	11	14	220	0.20	0.12 [0.04]	102/102	34/34
	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

cis-Heptachlor epoxide	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (pg/m^3)	2003 Warm season	3.5	3.5	28	0.45	0.015 [0.0048]	35/35	35/35
	2003 Cold season	1.3	1.3	6.6	0.49		34/34	34/34
	2004 Warm season	2.8	2.9	9.7	0.65	0.052 [0.017]	37/37	37/37
	2004 Cold season	1.1	1.1	7.0	0.44		37/37	37/37
	2005 Warm season	1.5	1.7	11	tr(0.10)	0.12 [0.044]	37/37	37/37
	2005 Cold season	0.91	0.81	2.9	0.43		37/37	37/37
	2006 Warm season	1.7	2.0	6.7	0.13	0.11 [0.04]	37/37	37/37
	2006 Cold season	0.74	0.88	3.2	nd		36/37	36/37
	2007 Warm season	2.9	2.8	13	0.54	0.03 [0.01]	36/36	36/36
	2007 Cold season	0.93	0.82	3.0	0.41		36/36	36/36
	2008 Warm season	2.4	2.2	9.9	0.53	0.022 [0.008]	37/37	37/37
	2008 Cold season	0.91	0.84	3.0	0.37		37/37	37/37

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

[9] Toxaphenes

・ 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.

・ Monitoring results

○ Parlar-26, Parlar-50, and Parlar-62

<Surface Water>

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

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

Parlar-62: The presence of the substance in surface water was monitored at 48 sites, and it was not detected at all 48 valid sites adopting the detection limit of 20 pg/L.

Stocktaking of the detection of Parlar-26, Parlar-50 and Parlar-62 in surface water during FY2002~2008

Parlar-26	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2003	nd	nd	nd	nd	40 [20]	0/36	0/36
	2004	nd	nd	nd	nd	9 [3]	0/38	0/38
	2005	nd	nd	nd	nd	10 [4]	0/47	0/47
	2006	nd	nd	nd	nd	16 [5]	0/48	0/48
	2007	nd	nd	nd	nd	20 [5]	0/48	0/48
	2008	nd	nd	nd	nd	8 [3]	0/48	0/48
Parlar-50	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2003	nd	nd	nd	nd	70 [30]	0/36	0/36
	2004	nd	nd	nd	nd	20 [7]	0/38	0/38
	2005	nd	nd	nd	nd	20 [5]	0/47	0/47
	2006	nd	nd	nd	nd	16 [5]	0/48	0/48
	2007	nd	nd	nd	nd	9 [3]	0/48	0/48
	2008	nd	nd	nd	nd	7 [3]	0/48	0/48
Parlar-62	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2003	nd	nd	nd	nd	300 [90]	0/36	0/36
	2004	nd	nd	nd	nd	90 [30]	0/38	0/38
	2005	nd	nd	nd	nd	70[30]	0/47	0/47
	2006	nd	nd	nd	nd	60 [20]	0/48	0/48
	2007	nd	nd	nd	nd	70 [30]	0/48	0/48
	2008	nd	nd	nd	nd	40 [20]	0/48	0/48

<Sediment>

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

Parlar-50: The presence of the substance in sediment was monitored at 64 sites, and it was not detected at all 64 valid sites adopting the detection limit of 6 pg/g-dry.

Parlar-62: The presence of the substance in sediment was monitored at 64 sites, and it was not detected at all 64 valid sites adopting the detection limit of 40 pg/g-dry.

Stocktaking of the detection of Parlar-26, Parlar-50 and Parlar-62 in sediment during FY2002~2008

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

<Wildlife>

Parlar-26: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 3 pg/g-wet, and none of the detected concentrations exceeded 22 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 3 pg/g-wet, and none of the detected concentrations exceeded 730 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 3 pg/g-wet, and none of the detected concentrations exceeded 1,200 pg/g-wet. As a result of the inter-annual trend analysis from FY 2003 to FY 2008, reduction tendency in specimens from black-tailded gulls was identified as statistically significant.

Parlar-50: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 6 of the 7 valid areas adopting the detection limit of 4 pg/g-wet, and none of the detected concentrations exceeded 23 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 4 pg/g-wet, and none of the detected concentrations exceeded 1,000 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in 1 of the 2 valid areas adopting the detection limit of 4 pg/g-wet, and none of the detected concentrations exceeded 1,600 pg/g-wet. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from black-tailded gulls was identified as statistically significant.

Parlar-62: The presence of the substance in bivalves was monitored in 7 areas, and it was not detected in all 7 valid areas adopting the detection limit of 30 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in 8 of the 17 valid areas adopting the detection limit of 30 pg/g-wet, and none of the detected concentrations exceeded 590 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in 1 of the 2 valid areas adopting the detection limit of 30 pg/g-wet, and none of the detected concentrations exceeded 360 pg/g-wet.

Stocktaking of the detection of Parlar-26, Parlar-50 and Parlar-62 in wildlife (bivalves, fish and birds) during FY2002~2008

Parlar-26	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	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(8)	tr(8)	20	nd	10[4]	26/31	6/7
	2008	tr(8)	tr(8)	22	nd	9 [3]	27/31	7/7
Fish (pg/g-wet)	2003	tr(29)	tr(24)	810	nd	45 [15]	44/70	11/14
	2004	tr(40)	tr(41)	1,000	nd	42 [14]	54/70	13/14
	2005	tr(39)	53	900	nd	47 [16]	50/75	13/16
	2006	37	44	880	nd	18 [7]	70/80	15/16
	2007	24	32	690	nd	10[4]	64/80	14/16
	2008	30	33	730	nd	9 [3]	79/85	17/17
Birds (pg/g-wet)	2003	110	650	2,500	nd	45 [15]	5/10	1/2
	2004	71	340	810	nd	42 [14]	5/10	1/2
	2005	85	380	1,200	nd	47 [16]	5/10	1/2
	2006	48	290	750	nd	18 [7]	5/10	1/2
	2007	34	280	650	nd	10[4]	5/10	1/2
	2008	40	320	1,200	nd	9 [3]	6/10	2/2
Parlar-50	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2003	tr(13)	tr(12)	58	nd	33 [11]	17/30	4/6
	2004	tr(16)	nd	tr(45)	nd	46 [15]	15/31	3/7
	2005	nd	nd	tr(38)	nd	54 [18]	9/31	4/7
	2006	tr(11)	14	32	nd	14 [5]	24/31	6/7
	2007	10	10	37	nd	9 [3]	27/31	7/7
	2008	tr(7)	tr(6)	23	nd	10 [4]	23/31	6/7
Fish (pg/g-wet)	2003	34	34	1,100	nd	33 [11]	55/70	14/14
	2004	54	61	1,300	nd	46 [15]	59/70	14/14
	2005	tr(50)	66	1,400	nd	54 [18]	55/80	13/16
	2006	49	52	1,300	nd	14 [5]	79/80	16/16
	2007	32	41	1,100	nd	9 [3]	77/80	16/16
	2008	38	45	1,000	nd	10 [4]	77/85	17/17
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

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
Fish (pg/g-wet)	2003	nd	nd	580	nd	120 [40]	9/70	3/14
	2004	nd	nd	870	nd	98 [33]	24/70	7/14
	2005	nd	nd	830	nd	100 [34]	23/80	8/16
	2006	tr(30)	nd	870	nd	70 [30]	28/80	10/16
	2007	nd	nd	530	nd	70 [30]	22/80	7/16
	2008	tr(30)	nd	590	nd	80 [30]	31/85	8/17
Birds (pg/g-wet)	2003	tr(96)	200	530	nd	120 [40]	5/10	1/2
	2004	tr(64)	110	280	nd	98 [33]	5/10	1/2
	2005	tr(77)	130	460	nd	100 [34]	5/10	1/2
	2006	70	120	430	nd	70 [30]	5/10	1/2
	2007	tr(60)	100	300	nd	70 [30]	5/10	1/2
	2008	tr(70)	130	360	nd	80 [30]	5/10	1/2

<Air>

Parlar-26: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at all 37 valid sites adopting the detection limit of 0.08 pg/m^3, and the detection range was tr(0.12)～0.58 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at 36 of the 37 valid sites adopting the detection limit of 0.08 pg/m^3, and none of the detected concentrations exceeded tr(0.20) pg/m^3.

Parlar-50: The presence of the substance in air in the warm season was monitored at 37 sites, and it was detected at 15 of the 37 valid sites adopting the detection limit of 0.09 pg/m^3, and none of the detected concentrations exceeded tr(0.19) pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and not detected at all 37 valid sites adopting the detection limit of 0.09 pg/m^3.

Parlar-62: The presence of the substance in air in the warm season was monitored at 37 sites, and it was not detected at all 37 valid sites adopting the detection limit of 0.6 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and not detected at all 37 valid sites adopting the detection limit of 0.6 pg/m^3.

Stocktaking of the detection of Parlar-26, Parlar-50 and Parlar-62 in air during FY2002~2008

Parlar-26	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	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

Parlar-50	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	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

Parlar-62	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	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

[10] Mirex

・ 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.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 48 sites, and it was detected at 4 of the 48 valid sites adopting the detection limit of 0.2 pg/L, and none of the detected concentrations exceeded 0.7 pg/L.

Stocktaking of the detection of Mirex in surface water during FY2002~2008

Mirex	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2003	tr(0.13)	tr(0.12)	0.8	nd	0.3 [0.09]	25/36	25/36
	2004	nd	nd	1.1	nd	0.4 [0.2]	18/38	18/38
	2005	nd	nd	1.0	nd	0.4 [0.1]	14/47	14/47
	2006	nd	nd	0.07	nd	1.6 [0.5]	1/48	1/48
	2007	nd	nd	tr(0.5)	nd	1.1[0.4]	2/48	2/48
	2008	nd	nd	0.7	nd	0.6 [0.2]	4/48	4/48

<Sediment>

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 48 of the 64 valid sites adopting the detection limit of 0.3 pg/g-dry, and none of the detected concentrations exceeded 820 pg/g-dry.

Stocktaking of the detection of Mirex in sediment during FY2002~2008

Mirex	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (pg/g-dry)	2003	tr(1.8)	tr(1.6)	1,500	nd	2 [0.4]	137/186	51/62
	2004	2.1	tr(1.6)	220	nd	2 [0.5]	153/189	55/63
	2005	1.5	1.2	5,300	nd	0.9 [0.3]	134/189	48/63
	2006	1.5	1.2	640	nd	0.6 [0.2]	156/192	57/64
	2007	1.3	0.9	200	nd	0.9[0.3]	147/192	55/64
	2008	1.1	1.1	820	nd	0.7 [0.3]	117/192	48/64

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was tr(2)～18 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was tr(1)～48 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 1 pg/g-wet, and the detection range was 27～260 pg/g-wet. As a result of the inter-annual trend analysis from FY 2003 to FY 2008, reduction tendency in specimens from gray starling s was identified as statistically significant.

Stocktaking of the detection of Mirex in wildlife (bivalves, fish and birds) during FY2002~2008

Mirex	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Bivalves (pg/g-wet)	2003	4.8	4.2	19	tr(1.6)	2.4 [0.81]	30/30	6/6
	2004	4.5	4.3	12	tr(1.1)	2.5 [0.82]	31/31	7/7
	2005	5.7	5.2	20	tr(1.9)	3.0 [0.99]	31/31	7/7
	2006	5	4	19	tr(2)	3 [1]	31/31	7/7
	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
Fish (pg/g-wet)	2003	7.9	9.0	25	tr(1.7)	2.4 [0.81]	70/70	14/14
	2004	11	11	180	3.8	2.5 [0.82]	70/70	14/14
	2005	12	13	78	tr(1.0)	3.0 [0.99]	80/80	16/16
	2006	10	10	53	tr(2)	3 [1]	80/80	16/16
	2007	9	11	36	tr(1)	3 [1]	80/80	16/16
	2008	11	13	48	tr(1)	4 [1]	85/85	17/17
Birds (pg/g-wet)	2003	110	150	450	31	2.4 [0.81]	10/10	2/2
	2004	61	64	110	33	2.5 [0.82]	10/10	2/2
	2005	76	66	180	41	3.0 [0.99]	10/10	2/2
	2006	72	70	280	39	3 [1]	10/10	2/2
	2007	56	59	100	32	3 [1]	10/10	2/2
	2008	72	68	260	27	4 [1]	10/10	2/2

<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 0.01 pg/m^3, and the detection range was 0.03～0.25 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.01 pg/m^3, and the detection range was 0.03～0.08 pg/m^3.

Stocktaking of the detection of Mirex in air during FY2002~2008

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

[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 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 2 pg/L, and the detection range was 9～1,100 pg/L.

β-HCH: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.4 pg/L, and the detection range was 15～1,800 pg/L. As a result of the inter-annual trend analysis from FY 2003 to FY 2008, reduction tendency in specimens from lake area was identified as statistically significant.

γ-HCH (synonym:Lindane): The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 1 pg/L, and the detection range was 4～340 pg/L.

δ-HCH: The presence of the substance in surface water was monitored at 48 sites, and it was detected at all 48 valid sites adopting the detection limit of 0.9 pg/L, and the detection range was tr(1.1)～1,900 pg/L.

Stocktaking of the detection of *α*-HCH, *β*-HCH, *γ*-HCH (synonym:Lindane) and *δ*-HCH in surface water during FY2002~2008

α-HCH	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (pg/L)	2002	84	76	6,500	1.9	0.9 [0.3]	114/114	38/38
	2003	120	120	970	13	3 [0.9]	36/36	36/36
	2004	150	145	5,700	13	6 [2]	38/38	38/38
	2005	90	81	660	16	4 [1]	47/47	47/47
	2006	110	90	2,100	25	3 [1]	48/48	48/48
	2007	76	73	720	13	1.9 [0.6]	48/48	48/48
	2008	78	75	1,100	9	4 [2]	48/48	48/48

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

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

δ-HCH	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency 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

<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 0.6 pg/g-dry, and none of the detected concentrations exceeded 5,200 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 0.3 pg/g-dry, and the detection range was 2.8～8,900 pg/g-dry.

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 0.4 pg/g-dry, and the detection range was tr(0.7)～2,200 pg/g-dry.

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 1 pg/g-dry, and none of the detected concentrations exceeded 3,300 pg/g-dry.

Stocktaking of the detection of α-HCH, β-HCH, γ-HCH (synonym:Lindane) and δ-HCH in sediment during FY2002~2008

α-HCH	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Sediment (pg/g-dry)	2002	130	170	8,200	2.0	1.2 [0.4]	189/189	63/63
	2003	140	170	9,500	2	2 [0.5]	186/186	62/62
	2004	140	180	5,700	tr(1.5)	2 [0.6]	189/189	63/63
	2005	120	160	7,000	3.4	1.7 [0.6]	189/189	63/63
	2006	130	160	4,300	tr(2)	5 [2]	192/192	64/64
	2007	120	150	12,000	tr(1.3)	1.8 [0.6]	192/192	64/64
	2008	120	190	5,200	nd	1.6 [0.6]	191/192	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	200	230	11,000	3.9	0.9 [0.3]	189/189	63/63
	2003	220	220	39,000	5	2 [0.7]	186/186	62/62
	2004	220	230	53,000	4	3 [0.8]	189/189	63/63
	2005	180	220	13,000	3.9	2.6 [0.9]	189/189	63/63
	2006	180	210	21,000	2.3	1.3 [0.4]	192/192	64/64
	2007	170	190	59,000	1.6	0.9 [0.3]	192/192	64/64
	2008	170	200	8,900	2.8	0.8 [0.3]	192/192	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	45	47	4,000	tr(1.4)	2 [0.4]	186/186	62/62
	2004	46	48	4,100	tr(0.8)	2 [0.5]	189/189	63/63
	2005	44	46	6,400	tr(1.8)	2.0 [0.7]	189/189	63/63
	2006	45	49	3,500	tr(1.4)	2.1 [0.7]	192/192	64/64
	2007	35	41	5,200	tr(0.6)	1.2 [0.4]	192/192	64/64
	2008	35	43	2,200	tr(0.7)	0.9 [0.4]	192/192	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	37	46	5,400	nd	2 [0.7]	180/186	61/62
	2004	48	55	5,500	tr(0.5)	2 [0.5]	189/189	63/63
	2005	46	63	6,200	nd	1.0 [0.3]	188/189	63/63
	2006	41	47	6,000	nd	1.7 [0.6]	189/192	64/64
	2007	22	28	5,400	nd	5 [2]	165/192	60/64
	2008	36	53	3,300	nd	2 [1]	186/192	64/64

<Wildlife>

α-HCH: TThe presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 7～380 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded 410 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 32～61 pg/g-wet. As results of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendencies in specimens from bivalves and averall birds were identified as statistically significant, and reduction tendencies in specimens from black-taild gulls and gray starlings were also identified as statistically significant.

β-HCH: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 23～1,100 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was tr(4)～750 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was 1,300～5,600 pg/g-wet. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from gray starlings was identified as statistically significant.

γ-HCH (synonym:Lindane): The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was tr(3)～98 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in 15 of the 17 valid areas adopting the detection limit of 3 pg/g-wet, and none of the detected concentrations exceeded 96 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 3 pg/g-wet, and the detection range was tr(5)～19 pg/g-wet.

δ-HCH: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 3 of the 7 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded 610 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in 12 of the 17 valid areas adopting the detection limit of 2 pg/g-wet, and none of the detected concentrations exceeded 77 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2 pg/g-wet, and the detection range was tr(3)～31 pg/g-wet. As a result of the inter-annual trend analysis from FY 2002 to FY 2008, reduction tendency in specimens from gray starlings was identified as statistically significant.

Stocktaking of the detection of α-HCH, β-HCH (synonym:Lindane), γ-HCH and δ-HCH in wildlife (bivalves, fish and birds) during FY2002~2008

α-HCH	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	65	64	1,100	12	4.2 [1.4]	38/38	8/8
	2003	45	30	610	9.9	1.8 [0.61]	30/30	6/6
	2004	35	25	1,800	tr(12)	13 [4.3]	31/31	7/7
	2005	24	25	1,100	tr(7.1)	11 [3.6]	31/31	7/7
	2006	21	21	390	6	3 [1]	31/31	7/7
	2007	19	17	1,400	8	7 [2]	31/31	7/7
	2008	18	16	380	7	6 [2]	31/31	7/7
Fish (pg/g-wet)	2002	51	56	590	tr(1.9)	4.2 [1.4]	70/70	14/14
	2003	41	58	590	2.6	1.8 [0.61]	70/70	14/14
	2004	57	55	2,900	nd	13 [4.3]	63/70	14/14
	2005	41	43	1,000	nd	11 [3.6]	75/80	16/16
	2006	42	53	360	tr(2)	3 [1]	80/80	16/16
	2007	37	40	730	tr(2)	7 [2]	80/80	16/16
	2008	35	47	410	nd	6 [2]	84/85	17/17
Birds (pg/g-wet)	2002	160	130	360	93	4.2 [1.4]	10/10	2/2
	2003	70	74	230	30	1.8 [0.61]	10/10	2/2
	2004	120	80	1,600	58	13 [4.3]	10/10	2/2
	2005	76	77	85	67	11 [3.6]	10/10	2/2
	2006	75	75	100	55	3 [1]	10/10	2/2
	2007	68	59	210	43	7 [2]	10/10	2/2
	2008	48	48	61	32	6 [2]	10/10	2/2

β-HCH	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2002	89	62	1,700	32	12 [4]	38/38	8/8
	2003	77	50	1,100	23	9.9 [3.3]	30/30	6/6
	2004	69	74	1,800	22	6.1 [2.0]	31/31	7/7
	2005	56	56	2,000	20	2.2 [0.75]	31/31	7/7
	2006	59	70	880	11	3 [1]	31/31	7/7
	2007	53	56	1,800	21	7 [3]	31/31	7/7
	2008	51	51	1,100	23	6 [2]	31/31	7/7
Fish (pg/g-wet)	2002	99	120	1,800	tr(5)	12 [4]	70/70	14/14
	2003	78	96	1,100	tr(3.5)	9.9 [3.3]	70/70	14/14
	2004	100	140	1,100	tr(3.9)	6.1 [2.0]	70/70	14/14
	2005	88	110	1,300	6.7	2.2 [0.75]	80/80	16/16
	2006	85	110	1,100	4	3 [1]	80/80	16/16
	2007	100	120	810	7	7 [3]	80/80	16/16
	2008	90	150	750	tr(4)	6 [2]	85/85	17/17
Birds (pg/g-wet)	2002	3,000	3,000	7,300	1,600	12 [4]	10/10	2/2
	2003	3,400	3,900	5,900	1,800	9.9 [3.3]	10/10	2/2
	2004	2,200	2,100	4,800	1,100	6.1 [2.0]	10/10	2/2
	2005	2,500	2,800	6,000	930	2.2 [0.75]	10/10	2/2
	2006	2,100	2,400	4,200	1,100	3 [1]	10/10	2/2
	2007	2,000	1,900	3,200	1,400	7 [3]	10/10	2/2
	2008	2,200	2,000	5,600	1,300	6 [2]	10/10	2/2

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(19)	tr(16)	230	nd	31 [10]	28/31	7/7
	2005	15	13	370	tr(5.7)	8.4 [2.8]	31/31	7/7
	2006	14	12	140	7	4 [2]	31/31	7/7
	2007	11	10	450	tr(4)	9 [3]	31/31	7/7
	2008	9	10	98	tr(3)	9 [3]	31/31	7/7
Fish (pg/g-wet)	2003	16	22	130	tr(1.7)	3.3 [1.1]	70/70	14/14
	2004	tr(27)	tr(24)	660	nd	31 [10]	55/70	11/14
	2005	17	17	230	nd	8.4 [2.8]	78/80	16/16
	2006	18	22	97	tr(2)	4 [2]	80/80	16/16
	2007	15	15	190	nd	9 [3]	71/80	15/16
	2008	13	16	96	nd	9 [3]	70/85	15/17
Birds (pg/g-wet)	2003	14	19	40	3.7	3.3 [1.1]	10/10	2/2
	2004	34	tr(21)	1,200	tr(11)	31 [10]	10/10	2/2
	2005	18	20	32	9.6	8.4 [2.8]	10/10	2/2
	2006	16	17	29	8	4 [2]	10/10	2/2
	2007	18	14	140	tr(8)	9 [3]	10/10	2/2
	2008	12	14	19	tr(5)	9 [3]	10/10	2/2

δ-HCH	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Site
Bivalves (pg/g-wet)	2003	7.2	tr(2.6)	1,300	nd	3.9 [1.3]	29/30	6/6
	2004	tr(3.0)	tr(2.1)	1,500	nd	4.6 [1.5]	25/31	6/7
	2005	tr(2.5)	tr(2.1)	1,600	nd	5.1 [1.7]	23/31	6/7
	2006	3	tr(2)	890	tr(1)	3 [1]	31/31	7/7
	2007	nd	nd	750	nd	4 [2]	12/31	4/7
	2008	nd	nd	610	nd	6 [2]	7/31	3/7
Fish (pg/g-wet)	2003	tr(3.5)	4.0	16	nd	3.9 [1.3]	59/70	13/14
	2004	tr(4.1)	tr(3.5)	270	nd	4.6 [1.5]	54/70	11/14
	2005	tr(3.2)	tr(3.1)	32	nd	5.1 [1.7]	55/80	12/16
	2006	4	3	35	nd	3 [1]	72/80	16/16
	2007	tr(3)	tr(2)	31	nd	4 [2]	42/80	10/16
	2008	tr(4)	tr(3)	77	nd	6 [2]	54/85	12/17
Birds (pg/g-wet)	2003	18	18	31	12	3.9 [1.3]	10/10	2/2
	2004	16	14	260	6.4	4.6 [1.5]	10/10	2/2
	2005	16	15	30	10	5.1 [1.7]	10/10	2/2
	2006	13	12	21	9	3 [1]	10/10	2/2
	2007	10	10	22	4	4 [2]	10/10	2/2
	2008	8	8	31	tr(3)	6 [2]	10/10	2/2

<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 0.04 pg/m^3, and the detection range was 25～1,700 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.04 pg/m^3, and the detection range was 10～890 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 0.01 pg/m^3, and the detection range was 0.88～73 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.01 pg/m^3, and the detection range was 0.46～37 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 0.03 pg/m^3, and the detection range was 5.4～540 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.03 pg/m^3, and the detection range was 2.7～230 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 0.02 pg/m^3, and the detection range was 0.25～57 pg/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at all 37 valid sites adopting the detection limit of 0.02 pg/m^3, and the detection range was 0.11～31 pg/m^3.

Stocktaking of the detection of α-HCH, β-HCH, γ-HCH (synonym:Lindane) and δ-HCH in air during FY2002~2008 in air during FY2002~2008

α-HCH	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency Sample	Detection frequency Site
Air (pg/m^3)	2003 Warm season	210	120	5,000	38	0.71 [0.24]	35/35	35/35
	2003 Cold season	49	35	1,400	9.9		34/34	34/34
	2004 Warm season	160	130	3,200	24	0.33 [0.11]	37/37	37/37
	2004 Cold season	68	52	680	11		37/37	37/37
	2005 Warm season	110	78	2,000	22	0.074 [0.024]	37/37	37/37
	2005 Cold season	35	22	630	9.6		37/37	37/37
	2006 Warm season	98	74	1,400	21	0.08 [0.03]	37/37	37/37
	2006 Cold season	41	26	630	7.6		37/37	37/37
	2007 Warm season	190	150	2,200	28	0.09 [0.04]	36/36	36/36
	2007 Cold season	46	33	730	9.7		36/36	36/36
	2008 Warm season	180	140	1,700	25	0.10 [0.04]	37/37	37/37
	2008 Cold season	66	40	890	10		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)	2003 Warm season	9.6	11	97	1.1	0.19 [0.063]	35/35	35/35
	2003 Cold season	2.1	1.6	57	0.52		34/34	34/34
	2004 Warm season	6.6	7.7	110	0.53	0.12 [0.041]	37/37	37/37
	2004 Cold season	2.6	2.6	78	0.32		37/37	37/37
	2005 Warm season	4.9	5.7	52	0.67	0.12 [0.044]	37/37	37/37
	2005 Cold season	1.1	1.1	16	0.24		37/37	37/37
	2006 Warm season	4.5	4.9	26	0.66	0.17 [0.06]	37/37	37/37
	2006 Cold season	0.98	0.99	17	tr(0.12)		37/37	37/37
	2007 Warm season	9.1	12	67	1.1	0.06 [0.02]	36/36	36/36
	2007 Cold season	1.9	2.1	17	0.52		36/36	36/36
	2008 Warm season	7.3	7.7	73	0.88	0.04 [0.01]	37/37	37/37
	2008 Cold season	2.2	2.3	37	0.46		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)	2003 Warm season	63	44	2,200	8.8	0.57 [0.19]	35/35	35/35
	2003 Cold season	14	12	330	3.1		34/34	34/34
	2004 Warm season	46	43	860	4.5	0.23 [0.076]	37/37	37/37
	2004 Cold season	19	16	230	2.6		37/37	37/37
	2005 Warm season	34	24	650	5.9	0.13 [0.044]	37/37	37/37
	2005 Cold season	9.3	6.6	110	2.1		37/37	37/37
	2006 Warm season	28	23	540	4.4	0.08 [0.03]	37/37	37/37
	2006 Cold season	12	11	270	2.5		37/37	37/37
	2007 Warm season	58	46	750	7.7	0.11 [0.04]	36/36	36/36
	2007 Cold season	13	11	160	2.3		36/36	36/36
	2008 Warm season	54	44	540	5.4	0.07 [0.03]	37/37	37/37
	2008 Cold season	20	20	230	2.7		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)	2003 Warm season	5.1	4.2	120	0.48	0.03 [0.01]	35/35	35/35
	2003 Cold season	0.97	0.76	47	0.11		34/34	34/34
	2004 Warm season	2.2	2.5	93	0.15	0.15 [0.05]	37/37	37/37
	2004 Cold season	0.76	0.77	18	tr(0.07)		37/37	37/37
	2005 Warm season	1.7	1.7	35	0.29	0.13 [0.04]	37/37	37/37
	2005 Cold season	0.38	0.41	11	nd		36/37	36/37
	2006 Warm season	2.0	2.0	17	tr(0.12)	0.14 [0.05]	37/37	37/37
	2006 Cold season	0.80	0.62	14	tr(0.13)		37/37	37/37
	2007 Warm season	2.8	3.2	37	0.27	0.05 [0.02]	36/36	36/36
	2007 Cold season	0.63	0.55	24	0.12		36/36	36/36
	2008 Warm season	2.4	2.1	57	0.25	0.04 [0.02]	37/37	37/37
	2008 Cold season	0.61	0.66	31	0.11		37/37	37/37

[12] Chlordecone

・ History and state of monitoring

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

FY 2008 was the first year for this Environmental Monitoring series, and the substance was measured in air in FY 2003 under the framework of "the Environmental Survey and Monitoring of Chemicals".

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 48 sites and, excluding 2 sites whose concentrations were treated as invalid, it was detected at 13 of 46 valid sites adopting the detection limit of 0.05 pg/L, and none of the detected concentrations exceeded 0.76 pg/L.

Stocktaking of the detection of Chlordecon in surface water in FY2008

Chlordecon	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

<Sediment>

The presence of the substance in sediment was monitored at 64 sites and, excluding 15 sites whose concentrations were treated as invalid, it was detected at 10 of 49 valid sites adopting the detection limit of 0.16 pg/g-dry, and none of the detected concentrations exceeded 5.8 pg/g-dry.

Stocktaking of the detection of Chlordecon in sedement in FY2008

Chlordecon	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

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was not detected in all 7 valid areas adopting the detection limit of 2.2 pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and not detected in all 17 valid areas adopting the detection limit of 2.2 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and not detected in all 2 valid areas adopting the detection limit of 2.2 pg/g-wet.

Stocktaking of the detection of Chlordecon in wildlife (bivalves, fish and birds) in FY2008

Chlordecon	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2008	nd	nd	nd	nd	5.6 [2.2]	0/31	0/7
Fish (pg/g-wet)	2008	nd	nd	nd	nd	5.6 [2.2]	0/85	0/17
Birds (pg/g-wet)	2008	nd	nd	nd	nd	5.6 [2.2]	0/10	0/2

[13] Polybrominated diphenyl ethers (Br_4～Br_{10})

・ 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.

FY 2008 was the first year for this Environmental Monitoring series, and the substances were measured in FY 1977, 1987, 1996, 2001-2005 under the framework of "the Environmental Survey and Monitoring of Chemicals".

・ Monitoring results

〇Tetrabromodiphenyl ethers, Pentabromodiphenyl ethers, Hexabromodiphenyl ether s, Heptabromodiphenyl ethers, Octabromodiphenyl ethers, nonabromodiphenyl ethers, decabromodiphenyl ether

<Wildlife>

Tetrabromodiphenyl ethes: The presence of the substances in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 2.2 pg/g-wet, and the detection range was 20～380 pg/g-wet. For fish, the presence of the substances was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 2.2 pg/g-wet, and the detection range was 9.8～1,300 pg/g-wet. For birds, the presence of the substances was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 2.2 pg/g-wet, and the detection range was 32～1,200 pg/g-wet.

Pentabromodiphenyl ethers: The presence of the substances in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 5.9 pg/g-wet, and the detection range was tr(11)～94 pg/g-wet. For fish, the presence of the substances was monitored in 17 areas and detected in 16 of the 17 valid areas adopting the detection limit of 5.9 pg/g-wet, and none of the detected concentrations exceeded 280 pg/g-wet. For birds, the presence of the substances was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 5.9 pg/g-wet, and the detection range was 52～440 pg/g-wet.

Hexabromodiphenyl ethers: The presence of the substances in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 5.0 pg/g-wet, and the detection range was tr(5.3)～82 pg/g-wet. For fish, the presence of the substances was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 5.0 pg/g-wet, and none of the detected concentrations exceeded 310 pg/g-wet. For birds, the presence of the substances was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 5.0 pg/g-wet, and the detection range was 62～380 pg/g-wet.

Heptabromodiphenyl ethers: The presence of the substances in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 6.7 pg/g-wet, and none of the detected concentrations exceeded 35 pg/g-wet. For fish, the presence of the substances was monitored in 17 areas and detected in 10 of the 17 valid areas adopting the detection limit of 6.7 pg/g-wet, and none of the detected concentrations exceeded 77 pg/g-wet. For birds, the presence of the substances was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 6.7 pg/g-wet, and the detection range was 19～53 pg/g-wet.

Octabromodiphenyl ethers: The presence of the substances in bivalves was monitored in 7 areas, and it was detected in 6 of the 7 valid areas adopting the detection limit of 3.6 pg/g-wet, and none of the detected concentrations exceeded 10 pg/g-wet. For fish, the presence of the substances was monitored in 17 areas and detected in 7 of the 17 valid areas adopting the detection limit of 3.6 pg/g-wet, and none of the detected concentrations exceeded 73 pg/g-wet. For birds, the presence of the substances was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 3.6 pg/g-wet, and the detection range was 30～64 pg/g-wet.

Nonabromodiphenyl ethers: The presence of the substances in bivalves was monitored in 7 areas, and it was detected in 1 of the 7 valid areas adopting the detection limit of 13 pg/g-wet, and none of the detected concentrations exceeded tr(23) pg/g-wet. For fish, the presence of the substances was monitored in 17 areas and detected in 2 of the 17 valid areas adopting the detection limit of 13 pg/g-wet, and none of the detected concentrations exceeded tr(15) pg/g-wet. For birds, the presence of the substances was monitored in 2 areas and detected in all 2 valid areas adopting the detection limit of 13 pg/g-wet, and none of the detected concentrations exceeded tr(33) pg/g-wet.

Decabromodiphenyl ether: The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 3 of the 7 valid areas adopting the detection limit of 74 pg/g-wet, and none of the detected concentrations exceeded tr(170) pg/g-wet. For fish, the presence of the substance was monitored in 17 areas and, excluding 1 area which concentration was treated as invalid, it was detected in 4 of 16 valid areas adopting the detection limit of 74 pg/g-wet, and none of the detected concentrations exceeded 230 pg/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in 1 of the 2 valid areas adopting the detection limit of 74 pg/g-wet, and none of the detected concentrations exceeded tr(110) pg/g-wet.

Stocktaking of the detection of Polybrominated diphenyl ethers (Br_4～Br_{10}) in wildlife (bivalves, fish and birds) in FY2008

Tetrabromo-diphenyl ethers	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (pg/g-wet)	2008	58	61	380	20	5.9 [2.2]	31/31	7/7
Fish (pg/g-wet)	2008	110	110	1,300	9.8	5.9 [2.2]	85/85	17/17
Birds (pg/g-wet)	2008	150	190	1,200	32	5.9 [2.2]	10/10	2/2
Pentabromo-diphenyl ethers	**Monitored year**	**Geometric mean**	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**Detection frequency Sample**	**Site**
Bivalves (pg/g-wet)	2008	28	27	94	tr(11)	16 [5.9]	31/31	7/7
Fish (pg/g-wet)	2008	30	37	280	nd	16 [5.9]	72/85	16/17
Birds (pg/g-wet)	2008	140	130	440	52	16 [5.9]	10/10	2/2
Hexabromo-diphenyl ethers	**Monitored year**	**Geometric mean**	**Median**	**Maximum**	**Minimum**	**Quantification [Detection] limit**	**Detection frequency Sample**	**Site**
Bivalves (pg/g-wet)	2008	18	16	82	tr(5.3)	14 [5.0]	31/31	7/7
Fish (pg/g-wet)	2008	44	51	310	nd	14 [5.0]	83/85	17/17
Birds (pg/g-wet)	2008	130	120	380	62	14 [5.0]	10/10	2/2
Heptabromo-diphenyl 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
Fish (pg/g-wet)	2008	tr(11)	tr(8.1)	77	nd	18 [6.7]	44/85	10/17
Birds (pg/g-wet)	2008	34	35	53	19	18 [6.7]	10/10	2/2

Octabromo-diphenyl 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
Fish (pg/g-wet)	2008	tr(5.5)	nd	73	nd	9.6 [3.6]	35/85	7/17
Birds (pg/g-wet)	2008	41	41	64	30	9.6 [3.6]	10/10	2/2
Nonabromo-diphenyl 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
Fish (pg/g-wet)	2008	nd	nd	tr(15)	nd	35 [13]	2/85	2/17
Birds (pg/g-wet)	2008	tr(20)	tr(20)	tr(33)	nd	35 [13]	9/10	2/2
Decabromo-diphenyl 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
Fish (pg/g-wet)	2008	nd	nd	230	nd	220 [74]	5/76	4/16
Birds (pg/g-wet)	2008	nd	nd	tr(110)	nd	220 [74]	4/10	1/2

(2) The Environmental Monitoring (excluding POPs)

Except for undetected cases of *N,N'*-Diphenyl-*p*-phenylenediamines and 2,4,6-Tri-*tert*-butylphenol in surface water, 2,4,6-Tri-*tert*-butylphenol in bivalves and fish, Dioctyltin compounds, Dibenzothiophene, 2,4,6-Tri-*tert*-butylphenol and Di-n-butyl phthalate in birds, all chemicals were detected.

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

[14] 2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym:Atrazine)

・ History and state of monitoring

2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym:Atrazine) has been used as a chemical herbicides.

Under the framework of the Environmental Monitoring, the substance was monitored in wildlife (bivalves, fish and birds) in FY 2006.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 48 sites, and it was detected at 19 of the 48 valid sites adopting the detection limit of 0.29 ng/L, and none of the detected concentrations exceeded 3.4 ng/L.

Stocktaking of the detection of 2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym:Atrazine) in surface water in FY2008

2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym:Atrazine)	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2008	nd	nd	3.4	nd	0.74 [0.29]	19/48	19/48

<Sediment>

The presence of the substance in sediment was monitored at 63 sites and, excluding 4 sites whose concentrations were treated as invalid, it was detected at 10 of 59 valid sites adopting the detection limit of 0.13 ng/g-dry, and none of the detected concentrations exceeded 4.1 ng/g-dry.

Stocktaking of the detection of 2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym:Atrazine) in sediment in FY2008

2-Chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine (synonym:Atrazine)	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (ng/g-dry)	2008	nd	nd	4.1	nd	0.34 [0.13]	12/173	10/59

[15] Dioctyltin compounds

・ History and state of monitoring

Dioctyltin compounds have been used as stabilizers for polyvinyl chloride and industrial catalytic substances.

Under the framework of the Environmental Monitoring, the substances were monitored in surface water, sediment, and wildlife (bivalves, fish and birds) in FY 2004 and in wildlife (bivalves, fish and birds) in FY 2006.

・ Monitoring results

<Surface Water>

The presence of the substances in surface water was monitored at 48 sites, and it was detected at 2 of the 48 valid sites adopting the detection limit of 0.6 ng/L, and none of the detected concentrations exceeded 10 ng/L.

Stocktaking of the detection of Dioctyltin compounds in surface water in FY2004 and FY2008

Dioctyltin compounds	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2004	nd	nd	nd	nd	5.5 [1.9]	0/38	0/38
	2008	nd	nd	10	nd	1.5 [0.6]	2/48	2/48

<Sediment>

The presence of the substances in sediment was monitored at 63 sites, and it was detected at 56 of the 63 valid sites adopting the detection limit of 0.09 ng/g-dry, and none of the detected concentrations exceeded 90 ng/g-dry.

Stocktaking of the detection of Dioctyltin compounds in sediment in FY2004 and FY2008

Dioctyltin compounds	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (ng/g-dry)	2004	tr(2.6)	nd	0.088	nd	6.0 [2.0]	81/189	33/63
	2008	0.71	0.63	90	nd	0.27 [0.09]	158/189	56/63

<Wildlife>

The presence of the substances in bivalves was monitored in 7 areas, and it was detected in 4 of the 7 valid areas adopting the detection limit of 0.10 ng/g-wet, and none of the detected concentrations exceeded 0.60 ng/g-wet. For fish, the presence of the substances was monitored in 17 areas and detected in 3 of the 17 valid areas adopting the detection limit of 0.10 ng/g-wet, and none of the detected concentrations exceeded 110 ng/g-wet. For birds, the presence of the substances was monitored in 2 areas and not detected in all 2 valid areas adopting the detection limit of 0.10 ng/g-wet.

Stocktaking of the detection of Dioctyltin compounds in wildlife (bivalves, fish and birds) in FY2004, FY2006 and FY2008

Dioctyltin compounds	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (ng/g-wet)	2004	nd	nd	nd	nd	3 [1]	0/31	0/7
	2006	nd	nd	tr(0.34)	nd	0.70 [0.27]	3/31	1/7
	2008	nd	nd	0.60	nd	0.26 [0.10]	13/31	4/7
Fish (ng/g-wet)	2004	nd	nd	tr(2.5)	nd	3 [1]	4/70	1/14
	2006	nd	nd	4.7	nd	0.70 [0.27]	7/80	3/16
	2008	nd	nd	110	nd	0.26 [0.10]	11/85	3/17
Birds (ng/g-wet)	2004	nd	nd	nd	nd	3 [1]	0/10	0/2
	2006	nd	nd	nd	nd	0.70 [0.27]	0/10	0/2
	2008	nd	nd	nd	nd	0.26 [0.10]	0/10	0/2

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

・ History and state of monitoring

N,N′-Diphenyl-*p*-phenylenediamines have been used as rubber antioxidants and the raw materials of styrene-butadiene rubber. *N,N′*-Ditolyl-*p*-phenylenediamine and *N,N′*-Dixylyl-*p*-phenylenediamine were designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law with *N*-Tolyl-*N′*-xylyl-*p*-phenylenediamine in September 2002. Although *N,N*-Ditolyl-*p*-phenylenediamine and *N,N*-Dixylyl-*p*-phenylenediamine are not manufactured, imported, and used in Japan, it is stated that it is important to survey the existing conditions in the environment due to their high accumulative in living organisms.

FY 2008 was the first year for this Environmental Monitoring series, and the substances were measured in surface water and air in FY 2004 under the framework of "the Environmental Survey and Monitoring of Chemicals".

・ Monitoring results

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

<Surface Water>

N,N′-Diphenyl-*p*-phenylenediamine: The presence of the substance in surface water was monitored at 48 sites, and it was not detected at all 48 valid sites adopting the detection limit of 1.7 ng/L.

N,N-Ditolyl-*p*-phenylenediamine: The presence of the substance in surface water was monitored at 48 sites, and it was not detected at all 48 valid sites adopting the detection limit of 2.0 ng/L.

N,N-Dixylyl-*p*-phenylenediamine: The presence of the substance in surface water was monitored at 48 sites, and it was not detected at all 48 valid sites adopting the detection limit of 2.1 ng/L.

Stocktaking of the detection of *N,N′*-Diphenyl-*p*-phenylenediamines in surface water in FY2008

N,N′-Diphenyl-*p*-phenylenediamine	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2008	nd	nd	nd	nd	4.4 [1.7]	0/48	0/48
N,N′-Ditolyl-*p*-phenylenediamine	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2008	nd	nd	nd	nd	5.1 [2.0]	0/48	0/48
N,N′-Dixylyl-*p*-phenylenediamine	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2008	nd	nd	nd	nd	5.4 [2.1]	0/48	0/48

[17] 2,6-Di-*tert*-butyl-4-methylphenol (synonym:BHT)

・ History and state of monitoring

2,6-Di-*tert*-butyl-4-methylphenol (synonym:BHT) has been used as an antioxidizing agent and as an antiplastic agent.

In previous monitoring series, under the framework of "the Surface Water/Sediment Monitoring", 2,6-Di-*tert*-butyl-4-methylphenol (synonym:BHT) in surface water and sediment was the monitored during the period of FY 1986～1998 and FY 1986～2001, respectively.

Under the framework of the Environmental Monitoring, the substance was monitored in sediment, wildlife (bivalves, fish and birds) and air in FY 2005.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 48 sites and, excluding 12 sites whose concentrations were treated as invalid, it was detected at 9 of 36 valid sites adopting the detection limit of 1.1 ng/L, and none of the detected concentrations exceeded 7.8 ng/L.

Stocktaking of the detection of 2,6-Di-*tert*-butyl-4-methylphenol (synonym:BHT) in surface water in FY2005 and FY2008

2,6-Di-*tert*-butyl-4-methylphenol (synonym:BHT)	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2008	nd	nd	7.8	nd	3.2 [1.1]	9/36	9/36

<Sediment>

The presence of the substance in sediment was monitored at 64 sites and, excluding 8 sites whose concentrations were treated as invalid, it was detected at 20 of 56 valid sites adopting the detection limit of 1.7 ng/g-dry, and none of the detected concentrations exceeded 300 ng/g-dry.

Stocktaking of the detection of 2,6-Di-*tert*-butyl-4-methylphenol (synonym:BHT) in sediment in FY2005 and FY2008

2,6-Di-*tert*-butyl-4-methylphenol (synonym:BHT)	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (ng/g-dry)	2005	nd	nd	27	nd	1.3 [0.60]	46/189	23/63
	2008	nd	nd	300	nd	5.1 [1.7]	51/164	20/56

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 6 of the 7 valid areas adopting the detection limit of 0.50 ng/g-wet, and none of the detected concentrations exceeded 1.8 ng/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in 14 of the 17 valid areas adopting the detection limit of 0.50 ng/g-wet, and none of the detected concentrations exceeded 26 ng/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in 1 of the 2 valid areas adopting the detection limit of 0.50 ng/g-wet, and none of the detected concentrations exceeded 2.5 ng/g-wet.

Stocktaking of the detection of 2,6-Di-*tert*-butyl-4-methylphenol (synonym:BHT) in wildlife (bivalves, fish and birds) in FY2005 and FY2008

2,6-Di-*tert*-butyl-4-methylphenol (synonym:BHT)	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (ng/g-wet)	2005	tr(2.1)	tr(2.0)	11	nd	2.3 [0.78]	29/31	7/7
	2008	tr(0.53)	tr(0.56)	1.8	nd	1.5 [0.50]	18/31	6/7
Fish (ng/g-wet)	2005	2.8	3.2	16	nd	2.3 [0.78]	70/80	15/16
	2008	tr(0.75)	tr(0.54)	26	nd	1.5 [0.50]	48/85	14/17
Birds (ng/g-wet)	2005	tr(0.92)	tr(1.0)	tr(1.9)	nd	2.3 [0.78]	7/10	2/2
	2008	tr(0.74)	tr(0.95)	2.5	nd	1.5 [0.50]	5/10	1/2

<Air>

The presence of the substance in air in the warm season was monitored at 37 sites and, excluding 3 sites whose concentrations were treated as invalid, it was detected at 33 of 34 valid sites adopting the detection limit of 1.5 ng/m^3, and none of the detected concentrations exceeded 230 ng/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and detected at 32 of the 37 valid sites adopting the detection limit of 1.5 ng/m^3, and none of the detected concentrations exceeded 1,000 ng/m^3.

Stocktaking of the detection of 2, 6-Di-tert-butyl-4-methylphenol (BHT) in air in FY2005 and FY2008

2,6-Di-*tert*-butyl-4-methylphenol (synonym: BHT)	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (ng/m^3)	2005 Warm season	13	14	3,800	nd	8.7 [2.9]	84/111	33/37
	2005 Cold season	6.3	6.2	210	nd		76/112	29/37
	2008 Warm season	6.6	6.0	230	nd	4.6 [1.5]	77/86	33/34
	2008 Cold season	tr(3.6)	tr(3.6)	1,000	nd		75/108	32/37

[18] Dibenzothiophene

・ History and state of monitoring

Dibenzothiophene has been used as an intermediate of medicine.

Under the framework of the Environmental Monitoring, the substance was monitored in surface water, sediment, and wildlife (bivalves, fish and birds) in FY 2005.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 48 sites, and it was detected at 13 of the 48 valid sites adopting the detection limit of 0.55 ng/L, and none of the detected concentrations exceeded 3.9 ng/L.

Stocktaking of the detection of Dibenzothiophene in surface water in FY2005 and FY2008

Dibenzothiophene	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2005	nd	nd	nd	nd	4.2 [2.0]	0/47	0/47
	2008	nd	nd	3.9	nd	1.4 [0.55]	13/48	13/48

<Sediment>

The presence of the substance in sediment was monitored at 64 sites, and it was detected at 61 of the 64 valid sites adopting the detection limit of 0.15 ng/g-dry, and none of the detected concentrations exceeded 79 ng/g-dry.

Stocktaking of the detection of Dibenzothiophene in sediment in FY2005 and FY2008

Dibenzothiophene	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (ng/g-dry)	2005	3.1	4.1	230	nd	0.50 [0.20]	173/189	61/63
	2008	1.6	2.4	79	nd	0.39 [0.15]	169/192	61/64

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 6 of the 7 valid areas adopting the detection limit of 0.082 ng/g-wet, and none of the detected concentrations exceeded 1.3 ng/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in 11 of the 17 valid areas adopting the detection limit of 0.082 ng/g-wet, and none of the detected concentrations exceeded 0.86 ng/g-wet. For birds, the presence of the substance was monitored in 2 areas and not detected in all 2 valid areas adopting the detection limit of 0.082 ng/g-wet.

Stocktaking of the detection of Dibenzothiophene in wildlife (bivalves, fish and birds) in FY2005 and FY2008

Dibenzothiophene	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (ng/g-wet)	2005	nd	nd	3.2	nd	0.3 [0.1]	9/31	4/7
	2008	nd	nd	1.3	nd	0.21 [0.082]	14/31	6/7
Fish (ng/g-wet)	2005	nd	nd	0.8	nd	0.3 [0.1]	27/80	7/16
	2008	tr(0.098)	nd	0.86	nd	0.21 [0.082]	36/85	11/17
Birds (ng/g-wet)	2005	nd	nd	nd	nd	0.3 [0.1]	0/10	0/2
	2008	nd	nd	nd	nd	0.21 [0.082]	0/10	0/2

[19] 2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym:Kelthane or Dicofol)

・ History and state of monitoring

2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym:Kelthane or Dicofol) has been used as a tick repellent. It was designated as a Class I Specified Chemical Substance under the Chemical Substances Constrol Law in April 2005. Although the substance has 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 accumulative in living organisms.

Under the framework of the Environmental Monitoring, the substance was monitored in wildlife (bivalves, fish and birds) in FY 2006.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 48 sites, and it was detected at 13 of the 48 valid sites adopting the detection limit of 0.010 ng/L, and none of the detected concentrations exceeded 0.076 ng/L.

Stocktaking of the detection of 2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym:Kelthane or Dicofol) in surface water in FY2008

2,2,2-Trichloro-1,1-bis(4-chlorophenyl) ethanol (synonym:Kelthane or Dicofol)	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2008	nd	nd	0.076	nd	0.025 [0.010]	13/48	13/48

<Sediment>

The presence of the substance in sediment was monitored at 63 sites, and it was detected at 13 of the 63 valid sites adopting the detection limit of 0.063 ng/g-dry, and none of the detected concentrations exceeded 0.46 ng/g-dry.

Stocktaking of the detection of 2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym:Kelthane or Dicofol) in sediment in FY2008

2,2,2-Trichloro-1,1-bis(4-chlorophenyl) ethanol (synonym:Kelthane or Dicofol)	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (ng/g-dry)	2008	nd	nd	0.46	nd	0.16 [0.063]	30/186	13/63

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 0.048 ng/g-wet, and none of the detected concentrations exceeded 0.21 ng/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in 14 of the 17 valid areas adopting the detection limit of 0.048 ng/g-wet, and none of the detected concentrations exceeded 0.27 ng/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in 1 of the 2 valid areas adopting the detection limit of 0.048 ng/g-wet, and none of the detected concentrations exceeded 0.30 ng/g-wet.

Stocktaking of the detection of 2,2,2-Trichloro-1,1-bis(4-chlorophenyl)ethanol (synonym:Kelthane or Dicofol) in wildlife (bivalves, fish and birds) in FY2006 and FY2008

2,2,2-Trichloro-1,1-bis(4-chlorophenyl) ethanol (synonym:Kelthane or Dicofol)	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves	2006	tr(0.064)	tr(0.070)	0.24	nd	0.092 [0.036]	22/31	5/7
(ng/g-wet)	2008	0.10	0.12	0.21	nd	0.12 [0.048]	28/31	7/7
Fish	2006	nd	nd	0.29	nd	0.092 [0.036]	5/80	1/16
(ng/g-wet)	2008	0.059	tr(0.077)	0.27	nd	0.12 [0.048]	55/85	14/17
Birds	2006	nd	nd	nd	nd	0.092 [0.036]	0/10	0/2
(ng/g-wet)	2008	nd	nd	0.30	nd	0.12 [0.048]	1/10	1/2

[20] 2,4,6-Tri-*tert*-butylphenol

・ History and state of monitoring

2,4,6-Tri-*tert*-butylphenol has been used as an antioxidant for rubber and plastic products. It was designated as a Class I Specified Chemical Substance under the Chemical Substances Control Law in September 2002. Although the substance has 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 accumulative in living organisms.

Under the framework of the Environmental Monitoring, the substance was monitored in wildlife (bivalves, fish and birds) and air in FY 2006.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 48 sites, and it was not detected at all 48 valid sites adopting the detection limit of 16 ng/L.

Stocktaking of the detection of 2,4,6-Tri-*tert*-butylphenol in surface water in FY2008

2,4,6-Tri-*tert*-butylphenol	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2008	nd	nd	nd	nd	41 [16]	0/48	0/48

<Sediment>

The presence of the substance in sediment was monitored at 63 sites, and it was detected at 1 of the 63 valid sites adopting the detection limit of 1.7 ng/g-dry, and none of the detected concentrations exceeded 17 ng/g-dry.

Stocktaking of the detection of 2,4,6-Tri-*tert*-butylphenol in sediment in FY2008

2,4,6-Tri-*tert*-butylphenol	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (ng/g-dry)	2008	nd	nd	17	nd	4.4 [1.7]	3/185	1/63

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was not detected in all 7 valid areas adopting the detection limit of 1.4 ng/g-wet. For fish, the presence of the substance was monitored in 17 areas and not detected in all 17 valid areas adopting the detection limit of 1.4 ng/g-wet. For birds, the presence of the substance was monitored in 2 areas and not detected in all 2 valid areas adopting the detection limit of 1.4 ng/g-wet.

Stocktaking of the detection of 2,4,6-Tri-*tert*-butylphenol in wildlife (bivalves, fish and birds) in FY2006 and FY2008

2,4,6-Tri-*tert*-butylphenol	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (ng/g-wet)	2006	nd	nd	nd	nd	5.7 [2.2]	0/31	0/7
	2008	nd	nd	nd	nd	3.7 [1.4]	0/31	0/7
Fish (ng/g-wet)	2006	nd	nd	tr(4.7)	nd	5.7 [2.2]	3/80	1/16
	2008	nd	nd	nd	nd	3.7 [1.4]	0/85	0/17
Birds (ng/g-wet)	2006	nd	nd	nd	nd	5.7 [2.2]	0/10	0/2
	2008	nd	nd	nd	nd	3.7 [1.4]	0/10	0/2

<Air>

The presence of the substance in air in the warm season was monitored at 37 sites and, excluding 4 sites whose concentrations were treated as invalid, it was not detected at all 33 valid sites adopting the detection limit of 0.22 ng/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and, excluding 3 sites whose concentrations were treated as invalid, it was detected at 1 of 34 valid sites adopting the detection limit of 0.22 ng/m^3, and none of the detected concentrations exceeded 1.7 ng/m^3.

Stocktaking of the detection of 2,4,6-Tri-*tert*-butylphenol in air in FY2006 and FY2008

2,4,6-Tri-*tert*-butyl phenol	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (ng/m^3)	2006 Warm season	nd	nd	13	nd	0.71 [0.28]	3/111	1/37
	2006 Cold season	nd	nd	nd	nd		0/111	0/37
Air (ng/m^3)	2008 Warm season	nd	nd	nd	nd	0.56 [0.22]	0/81	0/33
	2008 Cold season	nd	nd	1.7	nd		3/92	1/34

[21] Di-*n*-butyl phthalate

・ History and state of monitoring

Di-*n*-butyl phthalate has been used as a plasticizer.

In previous monitoring series, the substance was monitored in wildlife (bivalves, fish and birds) during the period of FY 1980～1985, 1987, 1989, 1991, 1993, 1995, 1999 under the framework of “the Wildlife Monitoring”.

Under the framework of “the Environmental Monitoring”, the substance was monitored in wildlife (bivalves, fish and birds) in FY 2006.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 48 sites and, excluding 3 sites whose concentrations were treated as invalid, it was detected at 18 of 45 valid sites adopting the detection limit of 69 ng/L, and none of the detected concentrations exceeded 660 ng/L.

Stocktaking of the detection of Di-*n*-butyl phthalate in surface water in FY2008

Di-*n*-butyl phthalate	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2008	tr(75)	nd	660	nd	190 [69]	18/45	18/45

<Sediment>

The presence of the substance in sediment was monitored at 63 sites and, excluding 1 site which concentration was treated as invalid, it was detected at 22 of 62 valid sites adopting the detection limit of 44 ng/g-dry, and none of the detected concentrations exceeded 780 ng/g-dry.

Stocktaking of the detection of Di-*n*-butyl phthalate in sediment in FY2008

Di-*n*-butyl phthalate	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (ng/g-dry)	2008	nd	nd	780	nd	130 [44]	33/184	22/62

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 2 of the 7 valid areas adopting the detection limit of 30 ng/g-wet, and none of the detected concentrations exceeded 100 ng/g-wet. For fish, the presence of the substance was monitored in 17 areas and detected in 12 of the 17 valid areas adopting the detection limit of 30 ng/g-wet, and none of the detected concentrations exceeded 180 ng/g-wet. For birds, the presence of the substance was monitored in 2 areas and not detected in all 2 valid areas adopting the detection limit of 30 ng/g-wet.

Stocktaking of the detection of Di-*n*-butyl phthalate in wildlife (bivalves, fish and birds) in FY2006 and FY2008

Di-*n*-butyl phthalate	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (ng/g-wet)	2006	nd	nd	tr(35)	nd	38 [15]	5/31	3/7
	2008	nd	nd	100	nd	84 [30]	2/31	2/7
Fish (ng/g-wet)	2006	tr(20)	tr(16)	990	nd	38 [15]	45/80	15/16
	2008	nd	nd	180	nd	84 [30]	34/85	12/17
Birds (ng/g-wet)	2006	nd	nd	tr(35)	nd	38 [15]	1/10	1/2
	2008	nd	nd	nd	nd	84 [30]	0/10	0/2

[22] Polychlorinated naphthalenes

・ History and state of monitoring

Polychlorinated naphthalenes have been used as machine oil. Substances with over 3 chloric ions were designated as a Class I Specified Chemical Substances under the Chemical Substances Control Law in August 1979.

In previous monitoring series, the substances were monitored in wildlife (bivalves, fish and birds) during the period of FY 1979～1985, 1987, 1989, 1991, 1993 under the framework of “the Wildlife Monitoring.”

Under the framework of “the Environmental Monitoring”, the substances ware monitored in wildlife (bivalves, fish and birds) in FY 2006.

・ Monitoring results

<Surface Water>

The presence of the substances in surface water was monitored at 48 sites, and it was detected at 9 of the 48 valid sites adopting the detection limit of 0.030 ng/L, and none of the detected concentrations exceeded 0.18 ng/L.

Stocktaking of the detection of Polychlorinated naphthalenes in surface water in FY2008

Polychlorinated naphthalenes	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2008	nd	nd	0.18	nd	※0.085 [0.030]	9/48	9/48

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

<Sediment>

The presence of the substances in sediment was monitored at 63 sites, and it was detected at 58 of 63 valid sites adopting the detection limit of 0.030 ng/g-dry, and none of the detected concentrations exceeded 28 ng/g-dry.

Stocktaking of the detection of Polychlorinated naphthalenes in sediment in FY2008

Polychlorinated naphthalenes	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (ng/g-dry)	2008	0.36	0.40	28	nd	※0.084 [0.030]	166/189	58/63

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

<Wildlife>

The presence of the substances in bivalves was monitored in 7 areas, and it was detected in all 7 valid areas adopting the detection limit of 0.010 ng/g-wet, and the detection range was tr(0.011)～1.3 ng/g-wet. For fish, the presence of the substances was monitored in 17 areas and detected in all 17 valid areas adopting the detection limit of 0.010 ng/g-wet, and none of the detected concentrations exceeded 2.2 ng/g-wet. For birds, the presence of the substances was monitored in 2 areas and detected in 1 of the 2 valid areas adopting the detection limit of 0.010 ng/g-wet, and none of the detected concentrations exceeded tr(0.022) ng/g-wet.

Stocktaking of the detection of Polychlorinated naphthalenes in wildlife (bivalves, fish and birds) in FY2008

Polychlorinated naphthalenes	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves (ng/g-wet)	2006	0.085	0.073	1.2	tr(0.019)	※0.027 [0.017]	31/31	7/7
	2008	0.077	0.073	1.3	tr(0.011)	※0.026 [0.010]	31/31	7/7
Fish (ng/g-wet)	2006	0.068	0.049	2.7	nd	※0.027 [0.017]	78/80	16/16
	2008	0.055	0.040	2.2	nd	※0.026 [0.010]	79/85	17/17
Birds (ng/g-wet)	2006	tr(0.017)	tr(0.018)	0.027	tr(0.011)	※0.027 [0.017]	10/10	2/2
	2008	nd	nd	tr(0.022)	nd	※0.026 [0.010]	5/10	1/2

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

<Air>

The presence of the substances in air in the warm season was monitored at 37 sites and, excluding 15 sites whose concentrations were treated as invalid, it was detected at all 22 valid sites adopting the detection limit of 0.0013 ng/m^3, and the detection range was 0.035～0.66 ng/m^3. For air in the cold season, the presence of the substance was monitored at 37 sites and, excluding 1 site which concentration was treated as invalid, it was detected at all 36 valid sites adopting the detection limit of 0.0013 ng/m^3, and the detection range was 0.015～0.91 ng/m^3.

The cause of the invalidity in 15 sites of warm season was the malfunction of measuring instruments used. After taking measure, the monitoring in cold season was conducted except for 1 site.

Stocktaking of the detection of Polychlorinated naphthalenes in air in FY2008

Polychlorinated naphthalenes	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Air (ng/m^3)	2008 Warm season	0.20	0.23	0.66	0.035	※0.0040 [0.0013]	22/22	22/22
	2008 Cold season	0.13	0.17	0.91	0.015		36/36	36/36

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

[23] Tri-*n*-butyl phosphate

・ History and state of monitoring

Tri-*n*-butyl phosphate has been used as a plasticizer.

In previous monitoring series, the substance was monitored in wildlife (bivalves, fish and birds) during the period of FY 1981～1985, 1987, 1989, 1991, 1993, 1995, 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 1988～1999 and FY 1988～2001, respectively.

Under the framework of “the Environmental Monitoring”, the substance was monitored in wildlife (bivalves, fish and birds) in FY 2006.

・ Monitoring results

<Surface Water>

The presence of the substance in surface water was monitored at 48 sites and, excluding 5 sites whose concentrations were treated as invalid, it was detected at 29 of 43 valid sites adopting the detection limit of 7.9 ng/L, and none of the detected concentrations exceeded 94 ng/L.

Stocktaking of the detection of t Tri-*n*-butyl phosphate in surface water in FY2008

Tri-*n*-butyl phosphate	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Surface water (ng/L)	2008	tr(11)	tr(12)	94	nd	24 [7.9]	29/43	29/43

<Sediment>

The presence of the substance in sediment was monitored at 63 sites and, excluding 3 sites whose concentrations were treated as invalid, it was detected at 41 of 60 valid sites adopting the detection limit of 0.73 ng/g-dry, and none of the detected concentrations exceeded 19 ng/g-dry.

Stocktaking of the detection of Tri-*n*-butyl phosphate in sediment in FY2008

Tri-*n*-butyl phosphate	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Sediment (ng/g-dry)	2008	tr(0.79)	tr(0.82)	19	nd	2.2 [0.73]	94/173	41/60

<Wildlife>

The presence of the substance in bivalves was monitored in 7 areas, and it was detected in 6 of the 7 valid areas adopting the detection limit of 0.40 ng/g-wet, and none of the detected concentrations exceeded 1.2 ng/g-wet. For fish, the presence of the substance was monitored in 17 areas and, excluding 1 area which concentration was treated as invalid, it was detected in 3 of 16 valid areas adopting the detection limit of 0.40 ng/g-wet, and none of the detected concentrations exceeded tr(0.70) ng/g-wet. For birds, the presence of the substance was monitored in 2 areas and detected in 1 of the 2 valid areas adopting the detection limit of 0.40 ng/g-wet, and none of the detected concentrations exceeded tr(0.63) ng/g-wet.

Stocktaking of the detection of Tri-*n*-butyl phosphate in wildlife (bivalves, fish and birds) in FY2008

Tri-*n*-butyl phosphate	Monitored year	Geometric mean	Median	Maximum	Minimum	Quantification [Detection] limit	Detection frequency	
							Sample	Site
Bivalves	2006	nd	nd	nd	nd	1.0 [0.4]	0/31	0/7
(ng/g-wet)	2008	tr(0.46)	tr(0.46)	1.2	nd	1.2 [0.40]	21/31	6/7
Fish	2006	nd	nd	nd	nd	1.0 [0.4]	0/80	0/16
(ng/g-wet)	2008	nd	nd	tr(0.7)	nd	1.2 [0.40]	8/76	3/16
Birds	2006	nd	nd	nd	nd	1.0 [0.4]	0/10	0/2
(ng/g-wet)	2008	nd	nd	tr(0.63)	nd	1.2 [0.40]	4/10	1/2