

Chapter 2 Results of the Detailed Environmental Survey in FY 2005

1. Purpose of the survey

The Detailed Environmental Survey is aimed at understanding the environmental persistence of 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) and chemicals requiring the Initial Environmental Risk Assessment.

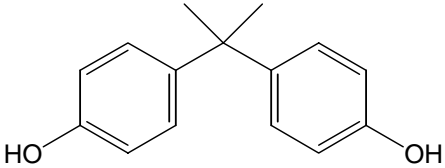
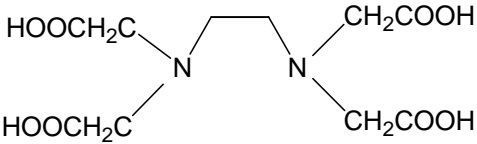
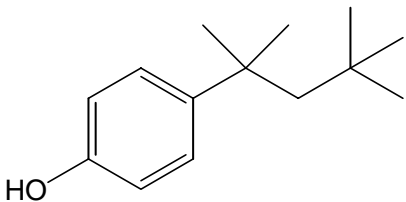
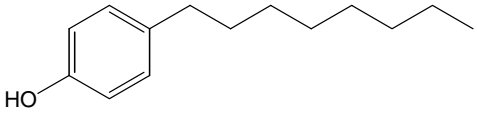
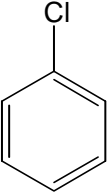
2. Target chemicals

In the FY 2005 Detailed Environmental Survey, 14 chemicals (groups) that were selected by the FY 2005 Expert Group for Promotion of the Environmental Survey and Monitoring of Chemicals were designated as target chemicals. The combinations of target chemicals and surveyed media are given below.

No	Target chemicals Name	Designated Class in		Surveyed media				
		The Chemical Substances Control Law	The PRTR Law	Surface water	Sediment	Wildlife		Air
						Bivalves	Fish	
1	4,4'-Isopropylidenediphenol (Bisphenol A)	III Monitored	I					
2	Ethylenediaminetetraacetic acid	II Monitored	I					
3	<i>p</i> -Octylphenols							
	[3-1] 4-(1,1,3,3-Tetramethylbutyl)phenol	III Monitored	I					
	[3-2] <i>p-n</i> -Octylphenol		I					
4	Chlorobenzene	III Monitored	I					
5	Diisopropylnaphthalene	I Monitored						
6	<i>o</i> -Dichlorobenzene	II Monitored	I					
		III Monitored						
7	<i>p</i> -Dichlorobenzene	II Monitored	I					
		III Monitored						
8	<i>N,N</i> -Dimethylformamide	II Monitored	I					
9	Short-chain chlorinated paraffins							
	[9-1] Chlorinated decane (Cl ₄ ~ Cl ₆)							
	Tetrachlorinated decane							
	Pentachlorinated decane							
	Hexachlorinated decane							
	[9-2] Chlorinated undecane (Cl ₅ ~ Cl ₇)							
	Pentachlorinated undecane							
	Hexachlorinated undecane							
	Heptachlorinated undecane	I Monitored						
	[9-3] Chlorinated dodecane (Cl ₅ ~ Cl ₇)							
	Pentachlorinated dodecane							
	Hexachlorinated dodecane							
	Heptachlorinated dodecane							
	[9-4] Chlorinated tridecane (Cl ₅ ~ Cl ₇)							
	Pentachlorinated tridecane							
	Hexachlorinated tridecane							
Heptachlorinated tridecane								
10	Nonylphenol	III Monitored	I					
11	Hydrazine	II Monitored	I					
		III Monitored						
12	Perfluorooctanoic acid	II Monitored						
13	Perfluorooctanesulphonic acid	II Monitored						
14	α -Methylstyrene (Isopropenylbenzene)	III Monitored	I					

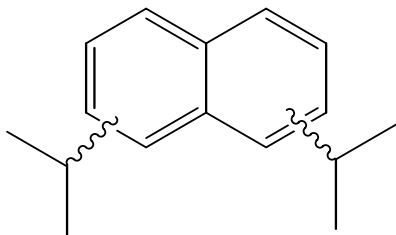
(Note) "The PRTR Law" hereafter means "Substance in the Law Concerning Reporting, etc. of Releases of Specific Chemical Substances to the Environment and Promoting Improvement in Their Management (Law No. 86 of 1999)."

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

<p>[1] 4,4'-Isopropylidenediphenol (bisphenol A)</p> 	<p>Molecular formula: C₁₅H₁₆O₂ CAS: 80-05-7 ENCS: 4-123 MW: 228.29 mp: 150 ~ 155 ¹⁾ bp: 220 (4mmHg)¹⁾ SW: 120mg/L (25 °C)²⁾ Specific gravity: 1.195 (25/25 °C)³⁾ logPow: 3.32²⁾</p>
<p>[2] Ethylenediaminetetraacetic acid</p> 	<p>Molecular formula: C₁₀H₁₆N₂O₈ CAS: 60-00-4 ENCS: 2-1263, 2-1296 MW: 292.24 mp: 245 (decomposition)⁴⁾ bp: Uncertain SW: 1,000mg/L (25 °C)⁵⁾ Specific gravity: Uncertain logPow: -3.86²⁾</p>
<p>[3] <i>p</i>-Octylphenols [3-1] 4-(1,1,3,3-Tetramethylbutyl)phenol</p> 	<p>Molecular formula: C₁₄H₂₂O CAS: 140-66-9 ENCS: 3-503 MW: 206.33 mp: 84 ~ 85 ⁶⁾ bp: 158 (2kPa)⁶⁾ SW: 5mg/L (25 °C)⁶⁾ Specific gravity: 0.89 g/mL (90 °C)⁶⁾ logPow: 5.28⁴⁾</p>
<p>[3-2] <i>p</i>-<i>n</i>-Octylphenol</p> 	<p>Molecular formula: C₁₄H₂₂O CAS: 1806-26-4 ENCS: 3-503 MW: 206.33 mp: 74 ⁶⁾ bp: 280 ⁵⁾ SW: Insoluble⁶⁾ Specific gravity: 0.889 (120 °C)⁶⁾ logPow: 1.4⁴⁾</p>
<p>[4] Chlorobenzene</p> 	<p>Molecular formula: C₆H₅Cl CAS: 108-90-7 ENCS: 3-31 MW: 112.56 mp: -45.2 ⁴⁾ bp: 131.7 ⁴⁾ SW: 502mg/L (25 °C)⁷⁾ Specific gravity: 1.1058 (20 °C)⁴⁾ logPow: 2.89²⁾</p>

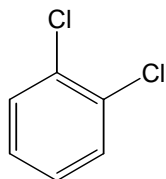
(Abbreviations) CAS: CAS registry number, ENCS: registry number in the Existing and New Chemical Substances List, MW: molecular weight, mp: melting point, bp: boiling point, SW: solubility in water, logPow: *n*-octanol-water partition coefficient, kPa: kilopascal (1 atom = 101.3kPa).

[5] Diisopropylnaphthalene



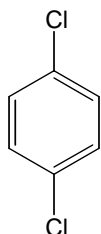
Molecular formula: C₁₆H₂₀
 CAS: 38640-62-9
 ENCS: 4-961
 MW: 212.33
 mp: Uncertain
 bp: 290 ~ 299 ⁶⁾
 SW: 0.11mg/L (25 °C)⁸⁾
 Specific gravity: 0.96 (25 °C)⁶⁾
 logPow: 4.9²⁾

[6] *o*-Dichlorobenzene



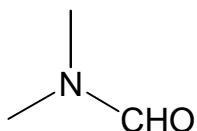
Molecular formula: C₆H₄Cl₂
 CAS: 95-50-1
 ENCS: 3-41
 MW: 147.00
 mp: -16.7 °C ⁴⁾
 bp: 180.1 °C ⁴⁾
 SW: 156mg/L (25 °C)⁷⁾
 Specific gravity: 1.31 (20 °C)⁴⁾
 logPow: 3.43²⁾

[7] *p*-Dichlorobenzene



Molecular formula: C₆H₄Cl₂
 CAS: 106-46-7
 ENCS: 3-41
 MW: 147.00
 mp: 52.7 °C ⁴⁾
 bp: 174 °C ⁴⁾
 SW: 76mg/L (25 °C)⁷⁾
 Specific gravity: 1.23 (20 °C)⁴⁾
 logPow: 3.44 (実測値)²⁾

[8] *N,N*-Dimethylformamide

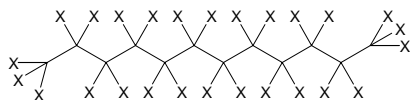


Molecular formula: C₃H₇NO
 CAS: 68-12-2
 ENCS: 2-680
 MW: 73.09
 mp: -61 °C ¹⁾
 bp: 153 °C ¹⁾
 SW: Readily soluble¹⁾
 Specific gravity: 0.9445 (25 °C)¹⁾
 logPow: -1.01²⁾

[9] Short-chain chlorinated paraffins

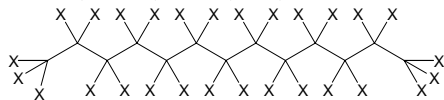
[9-1] Chlorinated decane (Cl₄ ~ Cl₆)

X=H (18 ~ 16) or Cl (4 ~ 6)



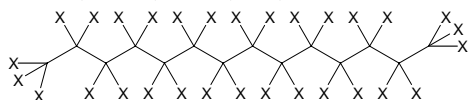
[9-2] Chlorinated undecane (Cl₅ ~ Cl₇)

X=H (19 ~ 17) or Cl (5 ~ 7)



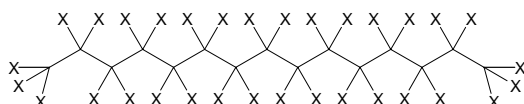
[9-3] Chlorinated dodecane (Cl₅ ~ Cl₇)

X=H (21 ~ 19) or Cl (5 ~ 7)



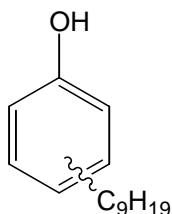
[9-4] Chlorinated tridecane (Cl₅ ~ Cl₇)

X=H (23 ~ 21) or Cl (5 ~ 7)



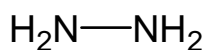
Molecular formula: C_nH_(2n-m+2)Cl_m (m=1 ~ 13, n=10 ~ 13)
 CAS: 85535-84-8 (C₁₀ ~ C₁₃)
 ENCS: 2-68
 MW: [9-1] 280.06 (C₁₀H₁₈Cl₄) ~ 348.95 (C₁₀H₁₆Cl₆)
 [9-2] 328.53 (C₁₁H₁₉Cl₅) ~ 397.42 (C₁₁H₁₇Cl₇)
 [9-3] 342.56 (C₁₂H₂₁Cl₅) ~ 411.45 (C₁₂H₁₉Cl₇)
 [9-4] 356.59 (C₁₃H₂₃Cl₅) ~ 425.48 (C₁₃H₂₁Cl₇)
 mp: Uncertain
 bp: Uncertain
 SW: Insoluble¹⁾
 Specific gravity: 1.00 ~ 1.07¹⁾
 logPow: 5 ~ 12²⁾

[10] Nonylphenol



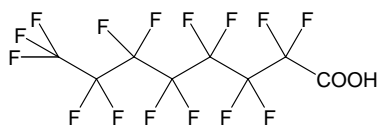
Molecular formula: C₁₅H₂₄O
 CAS: 25154-52-3
 ENCS: 3-503
 MW: 220.35
 mp: -10³⁾
 bp: 293 ~ 297¹⁾
 SW: 6.35mg/L (25⁹⁾)
 Specific gravity: 0.905 (20¹⁾)
 logPow: 5.71²⁾

[11] Hydrazine



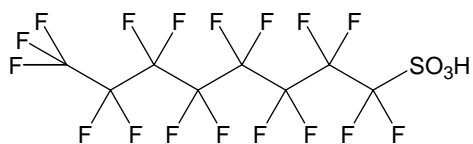
Molecular formula: H₄N₂
 CAS: 302-01-2
 ENCS: 1-374
 MW: 32.05
 mp: 2.0¹⁾
 bp: 113.5¹⁾
 SW: Readily soluble¹⁾
 Specific gravity: 1.011 (15¹⁾)
 logPow: -2.07²⁾

[12] Perfluorooctanoic acid



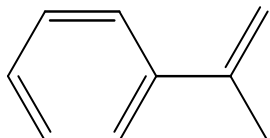
Molecular formula: C₈HF₁₅O₂
 CAS: 335-67-1
 ENCS: 2-1182, 2-2659
 MW: 414.09
 mp: 52 ~ 54¹⁰⁾
 bp: 189 (736 mmHg)¹⁰⁾
 SW: Uncertain
 Specific gravity: 1.792 (20¹⁰⁾)
 logPow: 6.30²⁾

[13] Perfluorooctanesulphonic acid



Molecular formula: $C_8HF_{17}O_3S$
 CAS: 1763-23-1
 ENCS: 2-15951
 MW: 500.13
 mp: 400 以上 (as a potassium salt)¹⁾
 bp: 277 ~ 280¹⁰⁾
 SW: 370mg/L (25 , as a potassium salt)²⁾
 Specific gravity: Uncertain
 logPow: 4.13²⁾

[14] α -Methylstyrene (Isopropenylbenzene)



Molecular formula: C_9H_{10}
 CAS: 98-83-9
 ENCS: 3-5, 3-8
 MW: 118.18
 mp: -23.2 ⁴⁾
 bp: 165.4 ⁴⁾
 SW: 116mg/L (25)⁷⁾
 Specific gravity: 0.91⁴⁾
 logPow: 3.48²⁾

References

- 1) O'Neil, The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals 13th Edition, Merck Co Inc. (2001)
- 2) Hansch et al., Exploring QSAR - Hydrophobic, Electronic and Steric Constants, American Chemical Society (1995)
- 3) Lewis, Hawley's Condensed Chemical Dictionary 13rd Edition, John Wiley & Sons (1997)
- 4) Lide, CRC Handbook of Chemistry and Physics 81st Edition, CRC Press LLC (2004-2005)
- 5) Hutzinger, Handbook of Environmental Chemistry, Springer-Verlag (1992)
- 6) Gerjartz, Ullmann's Encyclopedia of Industrial Chemistry 5th Edition Volume A1, VCH Publishers (1985)
- 7) Yalkowsky et al., Aquasol Database of Aqueous Solubility Version 5, College of Pharmacy, University of Arizona (1992)
- 8) Addison et al., The predicted environmental distribution of some PCB replacements, Chemosphere, 12, 827-834 (1983)
- 9) Shiu et al., Solubilities of pesticide chemicals in water Part II: data compilation, Reviews of Environmental Contamination and Toxicology, 116, 15-187 (1990)
- 10) Kirk-Othmer Encyclopedia of Chemical Technology 5th Edition, John Wiley & Sons (2004)

3. Surveyed site and procedure

In the Detailed Environmental Survey, the sampling and analysis of specimens was entrusted to prefectural governments and government-designated cities across Japan, and some specimens were analyzed by private analytical laboratories.

(1) Organisations responsible for sampling

Local communities	Organisations responsible for sampling	Surveyed media			
		Surface water	Sediment	Wildlife	Air
Hokkaido	Hokkaido Institute of Environmental Sciences				
Sapporo City	Sapporo City Institute of Public Health				
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				
Ibaraki Pref.	Ibaraki Kasumigaura Environmental Science Center				
Tochigi Pref.	Tochigi Prefectural Institute of Public Health and Environmental Science				
Saitama Pref.	Center for Environmental Science in Saitama				
Chiba Pref.	Chiba Prefectural Environmental Research Center				
Tokyo	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				
Ishikawa Pref.	Ishikawa Prefectural Institute of Public Health and Environmental Science				
Nagano Pref.	Nagano Environmental Conservation Research Institute				
Gifu Pref.	Gifu Prefectural Research Institute for Health and Environmental Sciences				
Aichi Pref.	Aichi Environmental Research Center				
Nagoya City	Nagoya City Environmental Science Research Institute				
Mie Pref.	Mie Prefectural Science and Technology Promotion Center				
Kyoto Pref.	Kyoto Prefectural Institute of Public Health and Environment				
Kyoto City	Kyoto City Institute of Health and Environmental Sciences				
Osaka Pref.	Osaka Prefecture Environmental Pollution Control Center				
Osaka City	Osaka City Institute of Public Health and Environmental Sciences				
Hyogo Pref.	Hyogo Prefectural Institute of Public Health and Environmental Sciences				
Wakayama Pref.	Wakayama Prefectural Research Center of Environment and Public Health				
Tottori Pref.	Tottori Prefectural Institute of Public Health and Environmental Science				
Shimane Pref.	Shimane Prefectural Institute of Public Health and Environmental Science				
Okayama Pref.	Okayama Prefectural Institute for Environmental Science and Public Health				
Hiroshima City	Hiroshima City Institute of Public Health				
Yamaguchi Pref.	Yamaguchi Prefectural Institute of Public Health and Environment				
Tokushima Pref.	Tokushima Prefectural Institute of Public Health and Environmental Sciences				
Kagawa Pref.	Kagawa Prefectural Research Institute for Environmental Sciences and Public Health				
Kochi Pref.	Kochi Prefectural Environmental Research Center				
Kitakyushu City	Kitakyushu City Institute of Environmental Sciences				
Fukuoka City	Fukuoka City Institute for Hygiene and the 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 2005.

(2) Surveyed sites (or areas) and target chemicals

Surveyed sites and target chemicals for surface water are shown in Table 2-1-1 and Figure 2-1-1. Surveyed sites and target chemicals for sediment are shown in Table 2-1-2 and Figure 2-1-1. Surveyed areas and target chemicals for wildlife were shown in Table 2-1-3 and Figure 2-1-2. Surveyed sites and target chemicals for air are shown in Table 2-1-4 and Figure 2-1-3. The breakdown is summarized as follows.

Surveyed media	Numbers of local communities	Numbers of target chemicals (groups)	Numbers of surveyed sites (or areas)	Numbers of samples at a surveyed site (or area)
Surface water	21	13	25	3
Sediment	9	5	10	3
Wildlife	23	4	25	3
Air	16	1	17	3

Table 2-1-1 List of surveyed sites (surface water) and target chemicals in the Detailed Environmental Survey in FY 2005

Local communities	Surveyed sites	Target chemicals																	
		[1]	[2]	[3-1]	[3-2]	[4]	[6]	[7]	[8]	[9-1]	[9-2]	[9-3]	[9-4]	[10]	[11]	[12]	[13]	[14]	
Hokkaido	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari (Ishikari City)																		
Iwate Pref.	Riv. Toyosawa (Hanamaki City)																		
Sendai City	Hirose-ohashi Bridge, Riv. Hirose (Sendai City)																		
Ibaraki Pref.	Tonekamome-ohashi Bridge, Mouth of Riv. Tone (Kamisu City)																		
	Katsuta-bashi Bridge, Riv. Naka (Hitachinaka City)																		
Tochigi Pref.	Riv. Tagawa (Utsunomiya City)																		
Saitama Pref.	Shiki-ohashi Bridge, Riv. Yanase (Shiki City)																		
	Kachi-hashii Bridge, Riv. Ichino (Yoshimi Town)																		
Chiba Pref.	Riv. Ichinomiya (Chosei Village)																		
Yokohama City	Kamenoko-bashi Bridge, Riv. Tsurumi (Yokohama City)																		
Kawasaki City	Mouth of Riv. Tama (Kawasaki City)																		
	Keihin Canal in Kawasaki Port																		
Niigata Pref.	Lower Riv. Shinano (Niigata City)																		
Ishikawa Pref.	Mouth of Riv. Sai (Kanazawa City)																		
Nagano Pref.	Lake Suwa (center)																		
Aichi Pref.	Nagoya Port																		
Mie Pref.	Yokkaichi Port																		
Kyoto Pref.	Miyazu Port																		
Kyoto City	Miyamae-bashi Bridge, Riv. Katsura (Kyoto City)																		
Osaka City	Osaka Port																		
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa (Wakayama City)																		
Okayama Pref.	Offshore of Mizushima																		
Yamaguchi Pref.	Tokuyama Bay																		
	Offshore of Hagi																		
Fukuoka City	Hakata Bay																		

[1] 4,4'-Isopropylidenediphenol (Bisphenol A), [2] Ethylenediaminetetraacetic acid, [3-1] 4-(1,1,3,3-Tetramethylbutyl)phenol, [3-2] *p*-*n*-Octylphenol, [4] Chlorobenzene, [6] *o*-Dichlorobenzene, [7] *p*-Dichlorobenzene, [8] *N,N*-Dimethylformamide, [9-1] Chlorinated decane (Cl₄ ~ Cl₆), [9-2] Chlorinated undecane (Cl₅ ~ Cl₇), [9-3] Chlorinated dodecane (Cl₅ ~ Cl₇), [9-4] Chlorinated tridecane (Cl₅ ~ Cl₇), [10] Nonylphenol, [11] Hydrazine, [12] Perfluorooctanoic acid, [13] Perfluorooctanesulphonic acid, [14] α -Methylstyrene (Isopropenylbenzene)

Table 2-1-2 List of surveyed sites (sediment) and target chemicals in the Detailed Environmental Survey in FY 2005

Local communities	Surveyed sites	Target chemicals							
		[5]	[9-1]	[9-2]	[9-3]	[9-4]	[11]	[12]	[13]
Ibaraki Pref.	Tonekamome-ohasi Bridge, Mouth of Riv. Tone (Kamisu City)								
Kawasaki City	Mouth of Riv. Tama (Kawasaki City)								
	Keihin Canal, Kawasaki Port								
Niigata Pref.	Lower Riv. Shinano (Niigata City)								
Ishikawa Pref.	Mouth of Riv. Sai (Kanazawa City)								
Aichi Pref.	Nagoya Port								
Kyoto Pref.	Miyazu Port								
Osaka City	Osaka Port								
Okayama Pref.	Offshore of Mizushima								
Fukuoka City	Hakata Bay								

[5] Diisopropylnaphthalene, [9-1] Chlorinated decane (Cl₄ ~ Cl₆), [9-2] Chlorinated undecane (Cl₅ ~ Cl₇), [9-3] Chlorinated dodecane (Cl₅ ~ Cl₇), [9-4] Chlorinated tridecane (Cl₅ ~ Cl₇), [11] Hydrazine, [12] Perfluorooctanoic acid, [13] Perfluorooctanesulphonic acid

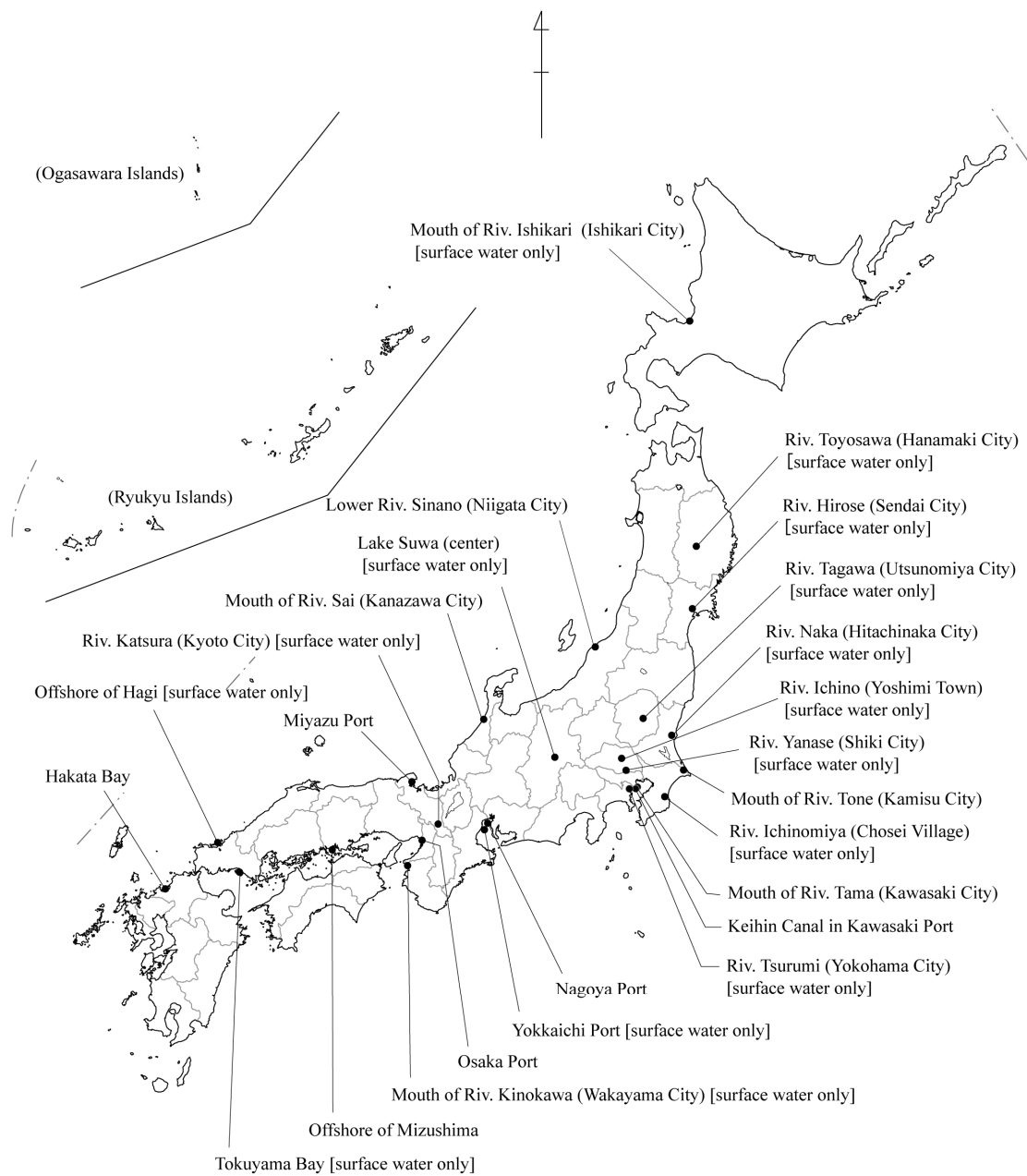


Figure 2-1-1 Surveyed sites (surface water and sediment) in the Detailed Environmental Survey in FY 2005

Table 2-1-3 List of surveyed areas (wildlife) and target chemicals in the Detailed Environmental Survey in FY 2005

Local communities	Surveyed areas	Wildlife species	Target chemicals						
			[5]	[9-1]	[9-2]	[9-3]	[9-4]	[12]	[13]
Hokkaido	Offshore of Kushiro	Rock greenling (<i>Hexagrammos otakii</i>)							
		Chum salmon (<i>Oncorhynchus keta</i>)							
	Offshore of Japan Sea (offshore of Iwanai)	Greenling (<i>Hexagrammos lagocephalus</i>)							
Iwate Pref.	Yamada Bay	Blue mussel (<i>Mytilus galloprovincialis</i>)							
Miyagi Pref.	Sendai Bay (Matsushima Bay)	Sea bass (<i>Lateolabrax japonicus</i>)							
Ibaraki Pref.	Offshore of Joban	Pacific saury (<i>Cololabis saira</i>)							
Tokyo Met.	Tokyo Bay	Sea bass (<i>Lateolabrax japonicus</i>)							
Yokohama City	Yokohama Port	Blue mussel (<i>Mytilus galloprovincialis</i>)							
Kawasaki City	Offshore of Ogi Island in Kawasaki Port	Sea bass (<i>Lateolabrax japonicus</i>)							
Niigata Pref.	Lower Riv. Shinano (Niigata City)	Carp (<i>Cyprinus carpio</i>)							
Ishikawa Pref.	Coast of Noto Peninsula	Blue mussel (<i>Mytilus galloprovincialis</i>)							
Mie Pref.	Ise Bay	Sea bass (<i>Lateolabrax japonicus</i>)							
Osaka Pref.	Osaka Bay	Sea bass (<i>Lateolabrax japonicus</i>)							
Osaka City	Osaka Port	Sea bass (<i>Lateolabrax japonicus</i>)							
Hyogo Pref.	Offshore of Himeji	Sea bass (<i>Lateolabrax japonicus</i>)							
Tottori Pref.	Nakaumi	Sea bass (<i>Lateolabrax japonicus</i>)							
Shimane Pref.	Shichirui Bay, Shimane Peninsula	Blue mussel (<i>Mytilus galloprovincialis</i>)							
Okayama Pref.	Offshore of Mizushima	Striped mullet (<i>Mugil cephalus</i>)							
Hiroshima City	Hiroshima Bay	Sea bass (<i>Lateolabrax japonicus</i>)							
Yamaguchi Pref.	Tokuyama Bay	Striped mullet (<i>Mugil cephalus</i>)							
	Offshore of Hagi	Striped mullet (<i>Mugil cephalus</i>)							
Tokushima Pref.	Naruto	Hard-shelled mussel (<i>Mytilus coruscus</i>)							
Kagawa Pref.	Takamatsu Port	Hard-shelled mussel (<i>Mytilus coruscus</i>)							
Kochi Pref.	Mouth of Riv. Shimanto (Shimanto City)	Sea bass (<i>Lateolabrax japonicus</i>)							
Kagoshima Pref.	West Coast of Satsuma Peninsula	Sea bass (<i>Lateolabrax japonicus</i>)							
Okinawa Pref.	Nakagusuku Bay	Okinawa seabream (<i>Acanthopagrus sivicolus</i>)							

[5] Diisopropylnaphthalene, [9-1] Chlorinated decane (Cl₄ ~ Cl₆), [9-2] Chlorinated undecane (Cl₅ ~ Cl₇), [9-3] Chlorinated dodecane (Cl₅ ~ Cl₇), [9-4] Chlorinated tridecane (Cl₅ ~ Cl₇), [12] Perfluorooctanoic acid, [13] Perfluorooctanesulphonic acid

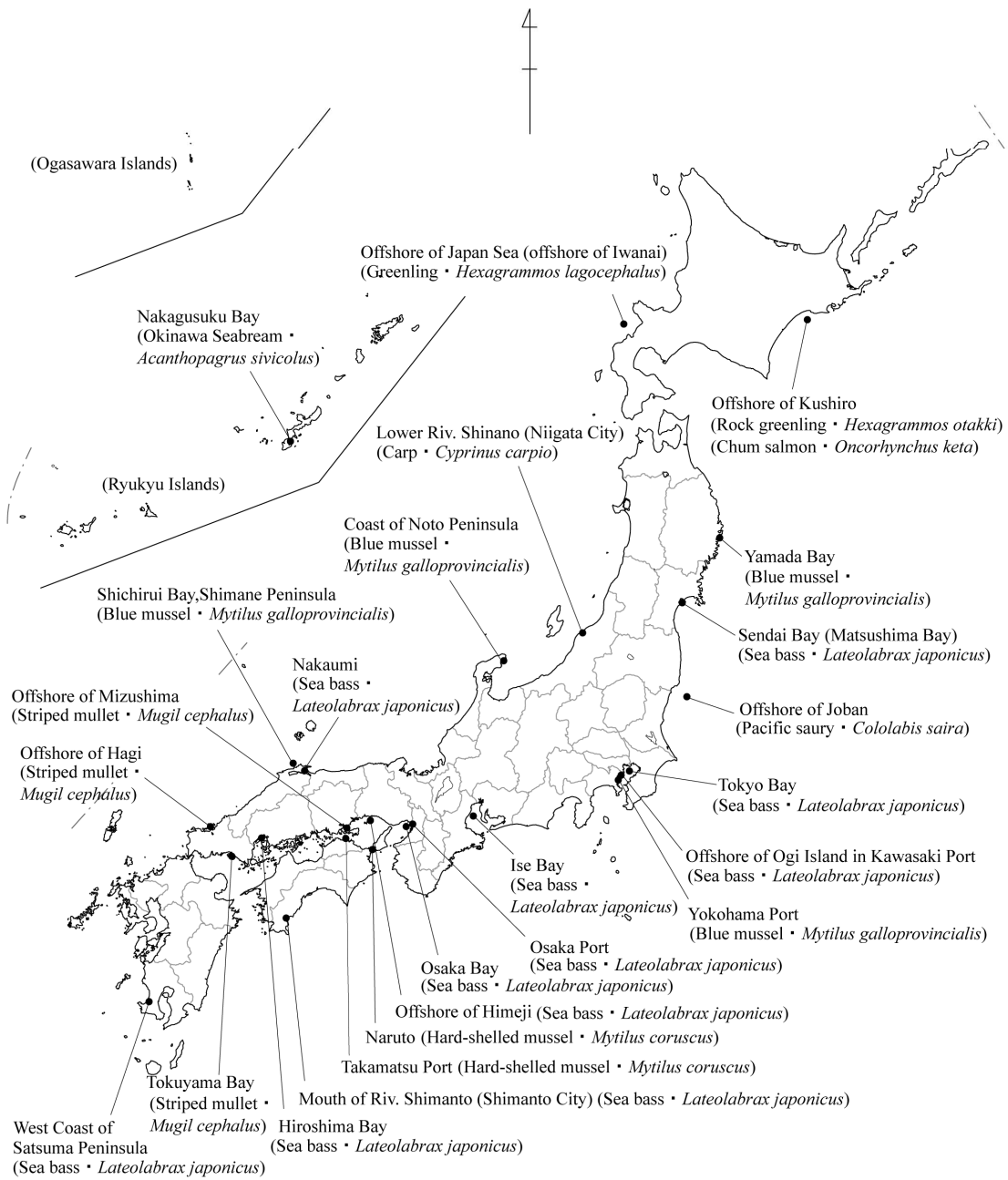


Figure 2-1-2 Surveyed areas (wildlife) in the Detailed Environmental Survey in FY 2005

Table 2-1-4 List of surveyed sites (air) and target chemicals in the Detailed Environmental Survey in FY 2005

Local communities	Surveyed sites	Target chemical
		[8] N,N-Dimethylformamide
Hokkaido	Hokkaido Institute of Environmental Sciences (Sapporo City)	
Sapporo City	Sapporo City Institute of Public Health (Sapporo City)	
Sendai City	Tsutsujigaoka Park (Sendai City)	
Saitama Pref.	Center for Environmental Science in Saitama (Kisai Town)	
Chiba Pref.	Ichihara-Matsuzaki Air Quality Monitoring Station (Ichihara City)	
Tokyo	Tokyo Metropolitan Research Institute for Environmental Protection (Koto Ward)	
	Chichijima Island	
Kanagawa Pref.	Kanagawa Environmental Research Center (Hiratsuka City)	
Gifu Pref.	Kakamigahara Air Quality Monitoring Station (Kakamigahara City)	
Nagoya City	Chikusa Ward Heiwa Park (Nagoya City)	
Mie Pref.	Mie Prefectural Science and Technology Promotion Center (Yokkaichi City)	
Kyoto Pref.	Kyoto Prefecture Joyo Senior High School (Joyo City)	
Kyoto City	Kyoto City Government Building (Kyoto City)	
Wakayama Pref.	Kainan City Government Building (Kainan City)	
Yamaguchi Pref.	Yamaguchi Prefectural Institute of Public Health and Environment (Yamaguchi City)	
Kagawa Pref.	Takamatsu Joint Prefectural Government Building (Takamatsu City)	
Kitakyushu City	Kitakyushu Monitoring Station (Kitakyushu City)	

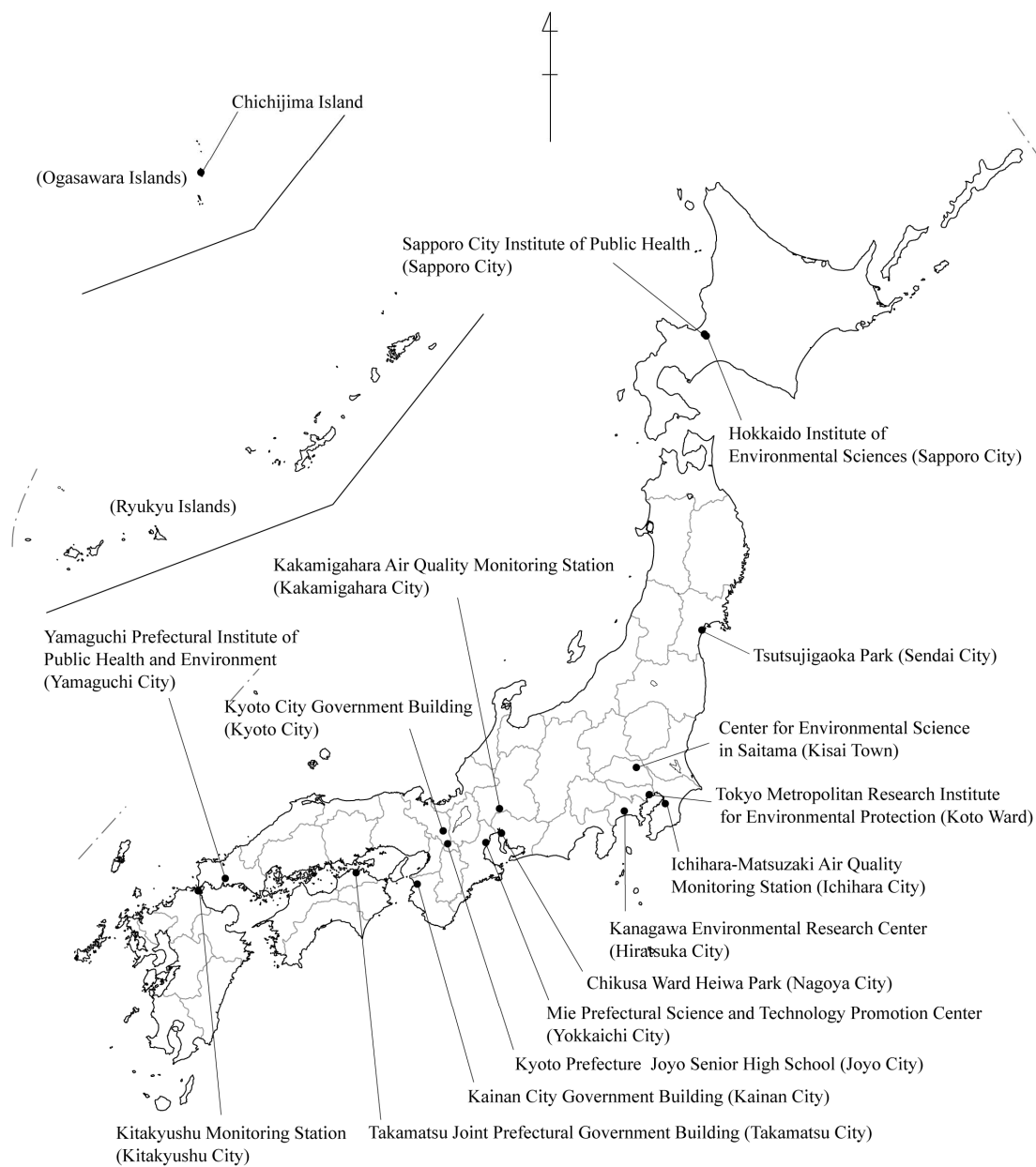


Figure 2-1-3 Surveyed sites (air) in the Detailed Environmental Survey in FY 2005

(3) Detection limit

The detection limits of analysed data reported by the analytical laboratory are not necessarily the same because of differences in the properties of specimens and in the available measurement equipment. To enable summarisation, therefore, a unified detection limit is predetermined and the analytical values reported by the analytical laboratory are summarised by the following procedure.

1) Treatment of measured value as an undetected value in high-sensitivity analysis

In the case of high-sensitivity analysis, in which the detection limit of the analytical laboratory is lower than the unified detection limit, any measured value lower than the unified detection limit is treated as an undetected value in the nationwide summary (see schematic).

2) Elimination of undetected values in low-sensitivity analysis from summary subject

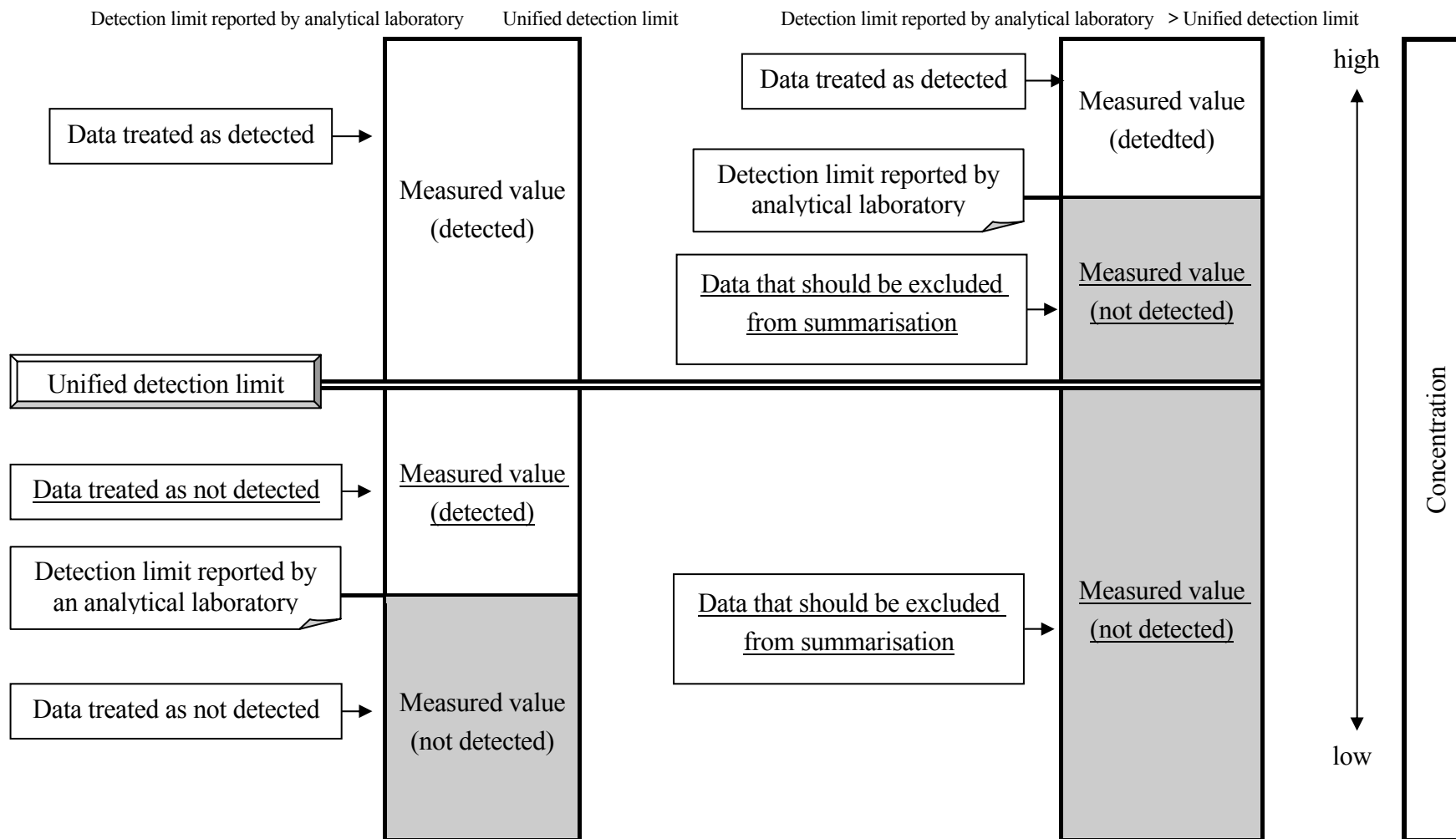
When the detection limit of the analytical laboratory is higher than the unified detection limit, any target chemical not detected is eliminated from the subject of the summary (see schematic).

When the instrument detection limit (IDL) and the method detection limit (MDL) are given in the analytical method, which is described in reports on the investigation of the development of analytical methods for chemicals and adopted in the Detailed Environmental Survey (hereafter, the Detailed Environmental Survey Analytical Method), if the IDL measured by the analytical laboratory is lower than the given IDL, the MDL of the Detailed Environmental Survey Analytical Method is used as the detection limit by the analytical laboratory.

When IDL and MDL are not given in the Detailed Environmental Survey Analytical Method, the detection limit is predetermined by the following procedure.

When the analytical laboratory calculates the appropriate IDL and MDL following the calculation method stated in the analytical method development instruction manuals, this calculated MDL is used as the detection limit by the analytical laboratory.

When the appropriate IDL and MDL are not calculated by the analytical laboratory, the signal/noise ratio (S/N ratio) is obtained from the results of addition and collection tests and from the chromatogram of environmental specimens, in order to calculate the specimen conversion concentration of the reference substance corresponding to $S/N=3$, from which the detection limit of the analytical laboratory is estimated; the maximum obtained value is designated as the detection limit for the analytical laboratory.



Schematic of procedure for data summarisation

4. Summary of survey results

The detection ranges and the detection limits are shown in Table 2-2. The survey results are summarized as follows.

In surface water, 8 out of 13 target chemicals (groups) were detected.

- [1] 4,4'-Isopropylidenediphenol (bisphenol A): 9 of the 10 valid sites
- [2] Ethylenediaminetetraacetic acid: 8 of the 8 valid sites
- [3-1] 4-(1,1,3,3-Tetramethylbutyl)phenol: 7 of the 11 valid sites
- [7] *p*-Dichlorobenzene: 3 of the 8 valid sites
- [8] *N,N*-Dimethylformamide: 4 of the 9 valid sites
- [10] Nonylphenol: 9 of the 9 valid sites
- [12] Perfluorooctanoic acid: 7 of the 7 valid sites
- [13] Perfluorooctanesulphonic acid: 7 of the 7 valid sites

In sediment, 4 out of 5 target chemicals (groups) were detected.

- [5] Diisopropylnaphthalene: 6 of the 7 valid sites
- [11] Hydrazine: 6 of the 6 valid sites
- [12] Perfluorooctanoic acid: 5 of the 6 valid sites
- [13] Perfluorooctanesulphonic acid: 7 of the 7 valid sites

In wildlife (bivalves or fish), 4 out of the 4 target chemicals (groups) were detected.

- [5] Diisopropylnaphthalene: 3 of the 6 valid areas (bivalves) and
10 of the 18 valid areas (fish)
- [9-1] Chlorinated decane (Cl₄ ~ Cl₆): 2 of the 18 valid areas (fish)
- [9-2] Chlorinated undecane (Cl₅ ~ Cl₇): 1 of the 6 valid areas (bivalves) and
2 of the 18 valid areas (fish)
- [9-3] Chlorinated dodecane (Cl₅ ~ Cl₇): 6 of the 18 valid areas (fish)
- [9-4] Chlorinated tridecane (Cl₅ ~ Cl₇): 2 of the 6 valid areas (bivalves) and
10 of the 18 valid areas (fish)
- [12] Perfluorooctanoic acid: 6 of the 6 valid areas (bivalves) and
17 of the 19 valid areas (fish)
- [13] Perfluorooctanesulphonic acid: 6 of the 6 valid areas (bivalves) and
19 of the 19 valid areas (fish)

In air, 1 out of the 1 target chemical was detected.

- [8] *N,N*-Dimethylformamide: 16 of the 16 valid sites

Table 2-2 Summary of the detection ranges and the detection limits in the Detailed Environmental Survey in FY 2005

No.	Target chemicals Name	Surface water [ng/L]		Sediment [ng/g-dry]		Wildlife [ng/g-wet]			Air [ng/m ³]	
		Detection range and frequency	Detection limit	Detection range and frequency	Detection limit	Bivalves Detection range and frequency	Fish Detection range and frequency	Detection limit	Detection range and frequency	Detection limit
1	4,4'-Isopropylidenediphenol (Bisphenol A)	nd ~ 1,000 9/10	2.4							
2	Ethylenediaminetetraacetic acid	2,200 ~ 260,000 8/8	33							
3	<i>p</i> -Octylphenols									
	[3-1] 4-(1,1,3,3-Tetramethylbutyl)phenol	nd ~ 24 7/11	1.9							
	[3-2] <i>p-n</i> -Octylphenol	nd 0/4	0.92							
4	Chlorobenzene	nd 0/9	2							
5	Diisopropylnaphthalene			nd ~ 7,500 6/7	2.0	nd ~ 2.0 3/6	nd ~ 27 10/18	0.19		
6	<i>o</i> -Dichlorobenzene	nd 0/8	7							
7	<i>p</i> -Dichlorobenzene	nd ~ 55 3/8	10							
8	<i>N,N</i> -Dimethylformamide	nd ~ 1,500 4/9	26						nd ~ 620 16/16	10
9	Short-chain chlorinated paraffins	nd 0/8	40	nd 0/4	3.6	nd ~ 0.09 3/6	nd ~ 1.8 11/18	1.0		
	[9-1] Chlorinated decane (Cl ₄ ~ Cl ₆)					nd 0/6	nd ~ 0.20 2/18	0.43		
	Tetrachlorinated decane					nd 0/6	nd 0/18	0.03		
	Pentachlorinated decane	nd 0/8	8.4	nd 0/4	1.4	nd 0/6	nd 0/18	0.20		
	Hexachlorinated decane					nd 0/6	nd ~ 0.20 2/18	0.20		
	[9-2] Chlorinated undecane (Cl ₅ ~ Cl ₇)					nd ~ 0.09 1/6	nd ~ 0.48 2/18	0.14		
	Pentachlorinated undecane					nd ~ 0.04 1/6	nd ~ 0.08 1/18	0.04		
	Hexachlorinated undecane	nd 0/8	9.9	nd 0/4	0.85	nd 0/6	nd ~ 0.13 1/18	0.06		
	Heptachlorinated undecane					nd ~ 0.09 1/6	nd ~ 0.28 2/18	0.04		
	[9-3] Chlorinated dodecane (Cl ₅ ~ Cl ₇)					nd 0/6	nd ~ 0.40 6/18	0.14		
	Pentachlorinated dodecane					nd 0/6	nd ~ 0.09 5/18	0.02		
	Hexachlorinated dodecane	nd 0/8	7.3	nd 0/4	0.80	nd 0/6	nd ~ 0.31 1/18	0.06		
	Heptachlorinated dodecane					nd 0/6	nd ~ 0.26 1/18	0.06		
	[9-4] Chlorinated tridecane (Cl ₅ ~ Cl ₇)					nd ~ 0.07 2/6	nd ~ 0.70 10/18	0.29		
	Pentachlorinated tridecane					nd 0/6	nd ~ 0.08 1/18	0.04		
	Hexachlorinated tridecane	nd 0/8	14	nd 0/4	0.51	nd 0/6	nd ~ 0.20 1/18	0.20		
	Heptachlorinated tridecane					nd ~ 0.07 2/6	nd ~ 0.42 10/18	0.05		
10	Nonylphenol	nd ~ 480 9/9	20							
11	Hydrazine	nd 0/3	1.3	nd ~ 66 6/6	0.65					

Target chemicals		Surface water [ng/L]		Sediment [ng/g-dry]		Wildlife [ng/g-wet]			Air [ng/m ³]	
No.	Name	Detection range and frequency	Detection limit	Detection range and frequency	Detection limit	Bivalves Detection range and frequency	Fish Detection range and frequency	Detection limit	Detection range and frequency	Detection limit
12	Perfluorooctanoic acid	0.24 ~ 47 7/7	0.04	nd ~ 1.3 5/6	0.024	0.043 ~ 0.27 6/6	nd ~ 0.66 17/19	0.034		
13	Perfluorooctanesulphonic acid	0.09 ~ 16 7/7	0.05	0.026 ~ 0.85 7/7	0.0072	nd ~ 1.6 6/6	nd ~ 6.6 19/19	0.018		
14	α -Methylstyrene (Isopropenylbenzene)	nd 0/4	9							

(Note 1) Detection frequency is based on the number of sites or areas, thus means (the number of detected sites/the number of surveyed sites). A site where data was not available was excluded from the number of surveyed sites. A site where the data became invalid under a unified detection limit was also excluded. 3 samples were measured for a site or area, and the detection in more than one out of samples from a site or area can be defined as one detected site or area.

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

(Note 3) means the medium was not surveyed.

(Note 4) is the sum value of for detection limits of each congener, and therefore a detection range that does not exceed this value can be shown instead of “nd”.